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CONTENTS

Chap 01.	Geomorphology	11-82
Chap 02.	Climatology	83-155
Chap 03.	Oceanography	156-225
Chap 04.	Geography of Environment	226-306
Chap 05.	Population and Settlement Geography	307-384
Chap 06.	Geography of Economic Activities and Regional Development	385-462
Chap 07.	Cultural, Social and Political Geography	463-533
Chap 08.	Geographic Thought	534-619
Chap 09.	Geographical Techniques	620-690
Chap 10.	Geography of India	691-768

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UNIVERSITY GRANTS COMMISSION
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NET SYLLABUS

Subject : GEOGRAPHY Code No.:(80)

Unit I - Geomorphology

Unit II - Climatology

Unit III- Oceanography

Unit IV- Geography of Environment

Unit V - Population and Settlement Geography

Unit VI- Geography of Economic Activities and Regional Development

Unit VII - Cultural, Social and Political Geography

Unit VIII - Geographic Thought

Unit IX - Geographical Techniques

Unit X- Geography of India

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UNIT-I

Geomorphology

Continental Drift, Plate Tectonics, Endogenetic and Exogenetic forces. Denudation and Weathering, Geomorphic Cycle (Davis and Penck), Theories and Process of Slope Development, Earth Movements (seismicity, folding, faulting and vulcanicity), Landform Occurrence and Causes of Geomorphic Hazards (earthquakes, volcanoes, landslides and avalanches)

UNIT –II

Climatology

Composition and Structure of Atmosphere; Insolation, Heat Budget of Earth, Temperature, Pressure and Winds, Atmospheric Circulation (air-masses, fronts and upper air circulation, cyclones and anticyclones (tropical and temperate), Climatic Classification of Koppen & Thornthwaite, ENSO Events (El Nino, La Nina and Southern Oscillations), Meteorological Hazards and Disasters (Cyclones, Thunderstorms, Tornadoes, Hailstorms, Heat and Cold waves Drought and Cloudburst , Glacial Lake Outburst (GLOF), Climate Change: Evidences and Causes of Climatic Change in the past, Human impact on Global Climate.

UNIT-III

Oceanography

Relief of Oceans, Composition: Temperature, Density and Salinity, Circulation: Warm and Cold Currents, Waves, Tides, Sea Level Changes, Hazards: Tsunami and Cyclone

UNIT –IV

Geography of Environment

Components: Ecosystem (Geographic Classification) and Human Ecology, Functions: Trophic Levels, Energy Flows, Cycles (geo-chemical, carbon, nitrogen and oxygen), Food Chain, Food Web and Ecological Pyramid, Human Interaction and Impacts, Environmental Ethics and Deep Ecology, Environmental Hazards and Disasters (Global Warming, Urban Heat Island, Atmospheric Pollution, Water Pollution, Land Degradation), National Programmes and Policies: Legal Framework, Environmental Policy, International Treaties, International Programmes and Polices (Brundtland Commission, Kyoto Protocol, Agenda 21, Sustainable Development Goals, Paris Agreement)

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UNIT –V

Population and Settlement Geography

Population Geography

Sources of population data (census, sample surveys and vital statistics, data reliability and errors). World Population Distribution (measures, patterns and determinants), World Population Growth (prehistoric to modern period). Demographic Transition, Theories of Population Growth (Malthus, Sadler, and Ricardo). Fertility and Mortality Analysis (indices, determinants and world patterns). Migration (types, causes and consequences and models), Population Composition and Characteristics (age, sex, rural-urban, occupational structure and educational levels), Population Policies in Developed and Developing Countries.

Settlement Geography

Rural Settlements (types, patterns and distribution), Contemporary Problems of Rural Settlements (rural-urban migration; land use changes; land acquisition and transactions), Theories of Origin of Towns (Gordon Childe, Henri Pirenne, Lewis Mumford), Characteristics and Processes of Urbanization in Developed and Developing Countries (factors of urban growth, trends of urbanisation, size, structure and functions of urban areas). Urban Systems (the law of the primate city and rank size rule) Central Place Theories (Christaller and Losch), Internal Structure of the City, Models of Urban Land Use (Burgess, Harris and Ullman , and Hoyt), Concepts of Megacities, Global Cities and Edge Cities, Changing Urban Forms (peri-urban areas, rural-urban fringe, suburban , ring and satellite towns), Social Segregation in the City, Urban Social Area Analysis, Manifestation of Poverty in the City (slums, informal sector growth, crime and social exclusion).

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Unit–VI:

Geography of Economic Activities and Regional Development

Economic Geography

Factors affecting spatial organisation of economic activities (primary, secondary, tertiary and quarternary), Natural Resources (classification, distribution and associated problems), Natural Resources Management. World Energy Crises in Developed and Developing Countries.

Agricultural Geography
Land capability classification and Land Use Planning, Cropping Pattern: Methods of delineating crop combination regions (Weaver, Doi and Rafiullah), Crop diversification, Von Thunen's Model of Land Use Planning. Measurement and Determinants of Agricultural Productivity, Regional variations in Agricultural Productivity, Agricultural Systems of the World.

Industrial Geography
Classification of Industries, Factors of Industrial Location; Theories of Industrial Location (A. Weber, E. M. Hoover, August Losch, A. Pred and D. M. Smith). World Industrial Regions, Impact of Globalisation on manufacturing sector in Less Developed Countries, Tourism Industry, World distribution and growth of Information And Communication Technology (ICT) and Knowledge Production (Education and R & D) Industries.

Geography of Transport and Trade
Theories and Models of spatial interaction (Edward Ullman and M. E. Hurst) Measures and Indices of connectivity and accessibility; Spatial Flow Models: Gravity Model and its variants, World Trade Organisation, Globalisation and Liberalisation and World Trade Patterns. Problems and Prospects of Inter and Intra Regional Cooperation and Trade.

Regional Development
Typology of Regions, Formal and Fictional Regions, World Regional Disparities, Theories of Regional Development(Albert O. Hirschman, Gunnar Myrdal, John Friedman, Dependency theory of Underdevelopment, Global Economic Blocks, Regional Development and Social Movements in India

Unit – VII: Cultural, Social and Political Geography

Cultural and Social Geography
Concept of Culture, Cultural Complexes, Areas and Region, Cultural Heritage, Cultural Ecology. Cultural Convergence, Social Structure and Processes, Social Well-being and Quality of Life, Social Exclusion, Spatial distribution of social groups in India (Tribe, Caste, Religion and Language), Environment and Human Health, Diseases Ecology, Nutritional Status (etiological conditions, classification and spatial and seasonal distributional patterns with special reference to India) Health Care Planning and Policies in India, Medical Tourism in India.

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Political Geography

Boundaries and Frontiers (with special reference to India), Heartland and Rimland Theories. Trends and Developments in Political Geography, Geography of Federalism, Electoral Reforms in India, Determinants of Electoral Behaviour, Geopolitics of Climate Change, Geopolitics of World Resources, Geo-politics of India Ocean, Regional Organisations of Cooperation (SAARC, ASEAN, OPEC, EU). Neopolitics of World Natural Resources.

Unit VIII: Geographic Thought

Contributions of Greek, Roman, Arab, Chinese and Indian Scholars, Contributions of Geographers (Bernhardus Varenius, Immanuel Kant, Alexander von Humboldt, Carl Ritter, Scheafer & Hartshorne), Impact of Darwinian Theory on Geographical Thought. Contemporary trends in Indian Geography: Cartography, Thematic and Methodological contributions. Major Geographic Traditions (Earth Science, man-environment relationship, area studies and spatial analysis), Dualisms in Geographic Studies (physical vs. human, regional vs. systematic, qualitative vs. quantitative, ideographic vs. nomothetic), Paradigm Shift, Perspectives in Geography (Positivism, Behaviouralism, Humanism, Structuralism, Feminism and Postmodernism).

Unit IX: Geographical Techniques

Sources of Geographic Information and Data (spatial and non-spatial), Types of Maps, Techniques of Map Making (Choropleth, Isarithmic, Dasymetric, Chorochromatic, Flow Maps) Data Representation on Maps (Pie diagrams, Bar diagrams and Line Graph, GIS Database (raster and vector data formats and attribute data formats). Functions of GIS (conversion, editing and analysis), Digital Elevation Model (DEM), Georeferencing (coordinate system and map projections and Datum), GIS Applications (thematic cartography, spatial decision support system), Basics of Remote Sensing (Electromagnetic Spectrum, Sensors and Platforms, Resolution and Types, Elements of Air Photo and Satellite Image Interpretation and Photogrammetry), Types of Aerial Photographs, Digital Image Processing: Developments in Remote Sensing Technology and Big Data Sharing and its applications in Natural Resources Management in India, GPS Components (space, ground control and receiver segments) and Applications, Applications of Measures of Central Tendency, Dispersion and Inequalities, Sampling, Sampling Procedure and Hypothesis Testing (*chi* square test, *t* test, ANOVA), Time Series Analysis, Correlation and Regression Analysis, Measurement of Indices, Making

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Indicators Scale Free, Computation of Composite Index, Principal Component Analysis and Cluster Analysis, Morphometric Analysis: Ordering of Streams, Bifurcation Ratio, Drainage Density and Drainage Frequency, Basin Circularity Ratio and Form Factor, Profiles, Slope Analysis, Clinographic Curve, Hypsographic Curve and Altimetric Frequency Graph.

Unit – X: Geography of India

Major Physiographic Regions and their Characteristics; Drainage System (Himalayan and Peninsular), Climate: Seasonal Weather Characteristics, Climatic Divisions, Indian Monsoon (mechanism and characteristics), Jet Streams and Himalayan Cryosphere, Types and Distribution of Natural Resources: Soil, Vegetation, Water, Mineral and Marine Resources. Population Characteristics (spatial patterns of distribution), Growth and Composition (rural-urban, age, sex, occupational, educational, ethnic and religious), Determinants of Population, Population Policies in India, Agriculture (Production, Productivity and Yield of Major Food Crops), Major Crop Regions, Regional Variations in Agricultural Development, Environmental, Technological and Institutional Factors affecting Indian Agriculture; Agro-Climatic Zones, Green Revolution, Food Security and Right to Food. Industrial Development since Independence, Industrial Regions and their characteristics, Industrial Policies in India. Development and Patterns of Transport Networks (railways, roadways, waterways, airways and pipelines), Internal and External Trade (trend, composition and directions), Regional Development Planning in India, Globalisation and its impact on Indian Economy, Natural Disasters in India (Earthquake, Drought, Flood, Cyclone, Tsunami, Himalayan Highland Hazards and Disasters.)

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CHAPTER 01
Geomorphology

1. Who among the following is credited with propounding the theory of Continental Drift?
(A) Harry Hess
(B) Alfred Wegener
(C) W. M. Davis
(D) Walther Penck

2. According to the Continental Drift theory, the southern supercontinent was named:
(A) Gondwanaland
(B) Laurasia
(C) Panthalassa
(D) Tethys

3. Consider the following statements:
Statement I : Endogenetic forces are constructive forces that create relief features on the Earth's surface.
Statement II : Exogenetic forces are destructive forces that seek to wear down the landscape to a level plain.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

4. Consider the following statements regarding the evidences for Continental Drift theory:
1. The coastlines of South America and Africa show a remarkable 'jig-saw' fit.
2. Fossils of the Mesosaurus have been found only in South America and Africa.
3. Tillite deposits, indicative of glaciation, are found in tropical regions of India and Australia.
4. The distribution of lemurs in India, Madagascar, and Africa supports the theory.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 2 and 4 only
(C) 1, 3 and 4 only
(D) 1, 2, 3 and 4

5. Which of the following statements correctly defines 'Denudation'?
(A) The singular process of rock disintegration without any subsequent movement.
(B) The movement of rock debris down a slope under the primary influence of gravity.
(C) The combined effect of weathering, mass wasting, erosion, and transportation.
(D) The deposition of weathered material by natural agents like wind and flowing water.

6. All of the following are considered endogenetic forces EXCEPT:
(A) Diastrophism
(B) Erosion
(C) Vulcanicity
(D) Seismicity

7. Match the items in List I with those in List II.
List I: (Concept)
P. Continental Drift
Q. Cycle of Erosion
R. Plate Tectonics
S. Slope Development Theory
List II: (Proponent)
1. W. M. Davis
2. Alfred Wegener
3. Harry Hess
4. Walther Penck

Choose the correct answer from the options given below:
(A) P-2, Q-1, R-3, S-4
(B) P-1, Q-2, R-4, S-3
(C) P-2, Q-3, R-1, S-4
(D) P-3, Q-4, R-2, S-1

8. The term 'Peneplain' in the Davisian model of geomorphic cycle is best described as:
(A) A low-lying plain of faint relief with occasional monadnocks.
(B) A plain surface formed by the process of marine deposition.
(C) A high-altitude plateau characterized by

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exceptionally steep sides.
(D) A flat plain created by the accumulation of volcanic lava flows.

9. If a region is characterized by the presence of anticlines and synclines, what geological process is most likely responsible for its formation?
(A) Faulting
(B) Vulcanicity
(C) Folding
(D) Weathering

10. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The Pacific Ring of Fire is a zone of high seismic and volcanic activity.
Reason (R) : It is located along the convergent plate boundaries where subduction is active.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

11. The formation of a rift valley is a direct consequence of which type of earth movement?
(A) Compressional forces causing large-scale folding.
(B) Isostatic adjustment of the Earth's rigid crust.
(C) Magmatic intrusion from the upper mantle layers.
(D) Tensional forces causing faulting.

12. Which of the following statements regarding Walther Penck's model of the geomorphic cycle is incorrect?
(A) It emphasizes the relationship between the rate of uplift and the rate of erosion.
(B) The cycle progresses through fixed stages of youth, maturity, and old age regardless of uplift.
(C) The development and retreat of slopes is considered a critical aspect of his model.
(D) The final, low-relief landform produced at the end of the cycle is called an 'Endrumpf'.

13. Consider the following processes:
1. Weathering
2. Diastrophism
3. Erosion
4. Vulcanicity
5. Mass Wasting

Which of the above are considered exogenetic processes?
(A) 1, 2, and 3
(B) 2, 4, and 5
(C) 1, 3, and 5
(D) 2, 3, and 4

14. What is the point of origin of an earthquake within the Earth's crust called?
(A) Epicenter
(B) Seismic Center
(C) Fault Line
(D) Focus or Hypocenter

15. The 'Theory of Plate Tectonics' provides a comprehensive explanation for which of the following phenomena?
(A) The distribution of earthquakes, volcanoes, and major mountain ranges.
(B) The long-term formation of global seasons and distinct climatic zones.
(C) The terrestrial processes of rock weathering and productive soil formation.
(D) The cyclical and eustatic changes in sea level over extensive geological time.

16. Which pair representing a landform and its associated force is correctly matched?
(A) Fold Mountain - Exogenetic force
(B) Rift Valley - Endogenetic force
(C) River Valley - Endogenetic force
(D) Peneplain - Endogenetic force

17. Consider the following statements:
Statement I : The theory of Plate Tectonics was a significant improvement over the Continental Drift theory because it proposed a viable mechanism for crustal movement.
Statement II : The mechanism proposed by Plate Tectonics is the convection currents in the Earth's mantle.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

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18. What does the term 'diastrophism' refer to?
(A) Slow, long-term deformation of the Earth's crust.
(B) Sudden and violent movements like earthquakes.
(C) The process of wearing away of the Earth's surface.
(D) The eruption of molten rock onto the surface.

19. Which of the following is an example of chemical weathering?
(A) Frost shattering
(B) Exfoliation
(C) Carbonation
(D) Granular disintegration

20. Arrange the following stages of the Davisian Cycle of Erosion in the correct chronological order:
1. Old Age
2. Maturity
3. Youth

Choose the correct option:
(A) 3, 2, 1
(B) 2, 3, 1
(C) 1, 2, 3
(D) 3, 1, 2

21. A transform plate boundary is characterized by:
(A) Plates moving apart and creating new crust.
(B) Plates colliding and one subducting under the other.
(C) Plates sliding past one another horizontally.
(D) Plates remaining stationary relative to each other.

22. A large, basin-shaped intrusive igneous body with a flat floor and concordant relationship with the host rock is known as a:
(A) Laccolith
(B) Lopolith
(C) Phacolith
(D) Batholith

23. Which one of the following is NOT a type of mechanical weathering?
(A) Unloading
(B) Frost action
(C) Thermal expansion and contraction
(D) Hydrolysis

24. Consider the following statements about Plate Tectonics:
1. The lithosphere is divided into several rigid plates.
2. The plates float on the semi-molten asthenosphere.
3. Plate movements are driven by convection currents in the mantle.
4. All plate boundaries are zones of intense geological activity.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 2, 3 and 4 only
(C) 1, 3 and 4 only
(D) 1, 2, 3 and 4

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25. The process of slope replacement, where a steeper slope is progressively replaced by a gentler one from the base upwards, is a central idea in the slope development theory of:
(A) W. M. Davis
(B) L. C. King
(C) Walther Penck
(D) G. K. Gilbert

26. Consider the following landforms:
1. Caldera
2. Anticline
3. Geyser
4. Graben
5. Lava Plateau

Which of the above landforms are typically associated with vulcanicity?
(A) 1, 2 and 4
(B) 1, 3 and 5
(C) 2, 3 and 4
(D) 2 and 5 only

27. The sudden slip along a fault is the primary cause of which geomorphic hazard?
(A) Landslide
(B) Volcano
(C) Avalanche
(D) Earthquake

28. According to W. M. Davis, the three key factors controlling the development of landforms are summed up in the "trio of":
(A) Uplift, Erosion, and Time
(B) Structure, Process, and Stage
(C) Climate, Vegetation, and Rock type

(D) Weathering, Mass Wasting, and Deposition

29. The forces of 'pole-fleeing' and 'tidal attraction' were proposed by Alfred Wegener as the driving mechanism for:
(A) Plate Tectonics
(B) Seafloor Spreading
(C) Continental Drift
(D) Isostatic Adjustment

30. Consider the following statements:
Statement I : Faulting is the fracturing and displacement of rock strata due to tensional or compressional forces.
Statement II : A normal fault results from compressional forces, causing one block to be pushed up over another.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

31. A 'monadnock' is a landform characteristic of which stage in the Davisian cycle?
(A) Old age stage
(B) Youthful stage
(C) Early mature stage
(D) Late mature stage

32. Match the items in List I with those in List II.
List I: (Type of Fault)
P. Normal Fault
Q. Reverse Fault
R. Strike-slip Fault
S. Horst
List II: (Description)
1. Crustal block pushed up between two reverse faults.
2. Horizontal displacement of blocks along the fault plane.
3. Caused by tensional forces, with the hanging wall moving down.
4. Caused by compressional forces, with the hanging wall moving up.
Choose the correct answer from the options given below:
(A) P-3, Q-4, R-2, S-1
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-1, R-2, S-4
(D) P-2, Q-4, R-3, S-1

33. Which of the following is an incorrect statement about seismic waves?
(A) P-waves are compressional waves and can travel through solids, liquids, and gases.
(B) L-waves (surface waves) are the fastest of all seismic waves.
(C) S-waves are transverse waves and can only travel through solids.
(D) The study of seismic waves provides information about the Earth's interior structure.

34. A landscape is in the 'mature' stage of the Davisian cycle. What feature would be most characteristic of this stage?
(A) Maximum possible relief with a well-integrated drainage network.
(B) Broad, flat-floored valleys with gentle slopes.
(C) Deep, narrow V-shaped valleys and significant vertical erosion.
(D) An almost featureless plain close to the base level of erosion.

35. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Chemical weathering is more dominant in hot and humid climates.
Reason (R) : High temperature and abundant water accelerate chemical reactions like hydrolysis and solution.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

36. The process by which outer layers of a rock peel off due to differential expansion and contraction is known as:
(A) Carbonation
(B) Frost wedging
(C) Hydration
(D) Exfoliation

37. A syncline is best defined as:
(A) A simple up-fold in rock strata.
(B) A fracture in the crust where there is no

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movement.
(C) A simple down-fold in rock strata.
(D) A block of land uplifted between two faults.

38. Which geomorphic hazard is most directly associated with the saturation of slope material with water, often after heavy rainfall?
(A) Earthquake
(B) Landslide
(C) Volcanic eruption
(D) Avalanche

39. Consider the following statements about slope development:
1. The theory of slope decline was championed by W.M. Davis.
2. Walther Penck's model is based on the concept of slope replacement.
3. Parallel retreat of slopes, maintaining a constant angle, is central to L.C. King's theory.
4. Slope development is independent of climate and rock structure.

Which of the above statements are correct?
(A) 1, 2 and 3
(B) 2 and 4
(C) 1 and 3 only
(D) 1, 2, 3 and 4

40. The supercontinent Pangea began to break apart into Laurasia and Gondwanaland, separated by which sea?
(A) Tethys Sea
(B) Panthalassa
(C) Atlantic Ocean
(D) Iapetus Ocean

41. Subduction zones, where one plate is forced beneath another, are characteristic of which type of plate boundary?
(A) Divergent
(B) Transform
(C) Convergent
(D) Passive

42. Which of the following is NOT a landform created by endogenetic forces?
(A) Alluvial fans
(B) Fold mountains
(C) Rift valleys
(D) Volcanic cones

43. Which of the following correctly pairs a weathering process with its description?
(A) Oxidation - The absorption of water by minerals, causing them to swell.
(B) Carbonation - The reaction of oxygen with minerals, especially iron, to form oxides.
(C) Hydrolysis - The freezing of water in cracks, which expands and breaks the rock.
(D) Solution - The dissolving of soluble minerals like rock salt by water.

44. Which of the following statements about an avalanche is true?
(A) It is a type of volcanic eruption involving ash and gas.
(B) It is a rapid downslope movement of a large mass of snow and ice.
(C) It refers to the slow, downslope creep of soil.
(D) It is a geomorphic hazard exclusively caused by earthquakes.

45. In Penck's model of slope development, the term 'aufsteigende entwicklung' refers to a phase where:
(A) The rate of uplift is less than the rate of down-cutting, leading to declining relief.
(B) The rate of uplift equals the rate of down-cutting, maintaining constant relief.
(C) The rate of uplift is greater than the rate of down-cutting, leading to increasing relief.
(D) The landscape has been reduced to a final, low-relief plain (endrumpf).

46. Which of the following geological features would be the most convincing evidence for sea-floor spreading?
(A) The presence of deep-sea trenches along continental margins.
(B) The discovery of ancient fossils on different continents.
(C) The existence of large, flat abyssal plains.
(D) The symmetrical pattern of magnetic anomalies on either side of mid-oceanic ridges.

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47. Consider the following statements:
Statement I : Vulcanicity is the process through which gases and molten rock are extruded onto the Earth's surface or intruded into the Earth's crust.
Statement II : A batholith is a large extrusive

volcanic landform.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

48. A landform created by faulting where a block of land is elevated between two normal faults is called a:
(A) Graben
(B) Horst
(C) Syncline
(D) Monocline

49. Which of the following conditions would be least favorable for chemical weathering?
(A) Hot and humid tropical region
(B) Hot and arid desert region
(C) Warm and temperate coastal region
(D) A region with limestone bedrock and moderate rainfall

50. Consider the following ideas associated with geomorphic theories:
1. Landforms are a function of structure, process, and stage.
2. The form of a slope is an expression of the phase and rate of uplift in relation to denudation.
3. Continents have moved over the surface of the Earth.
4. The lithosphere is broken into plates that move relative to each other.
5. The end product of the cycle is a peneplain.

Which of these ideas are central to W.M. Davis's Geomorphic Cycle?
(A) 1 and 5 only
(B) 2 and 4 only
(C) 1, 3, and 5
(D) 1, 2, 3, 4, and 5

51. The epicenter of an earthquake is defined as:
(A) The point deep within the Earth where the earthquake originates.
(B) The point on the Earth's surface directly above the focus.
(C) The entire length of the fault that ruptured.
(D) The area that experiences the most structural damage.

52. The term 'exogenetic forces' refers to processes that:
(A) Originate from within the earth's crust.
(B) Derive their energy from sources external to the solid earth, like the sun.
(C) Are driven primarily by the earth's internal heat.
(D) Are responsible for the creation of continents and ocean basins.

53. In the context of slope development, 'parallel retreat' is a concept most closely associated with:
(A) W. M. Davis
(B) Walther Penck
(C) L. C. King
(D) G. K. Gilbert

54. The process of folding is an example of which type of force?
(A) Tensional
(B) Compressional
(C) Gravitational
(D) Epeirogenic

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55. Which of the following is not a primary component of the process of denudation?
(A) Weathering
(B) Erosion
(C) Vulcanicity
(D) Mass wasting

56. Which statement incorrectly describes a characteristic of Plate Tectonics?
(A) Divergent boundaries are where new oceanic crust is formed.
(B) Transform boundaries are characterized by extensive volcanic activity.
(C) Convergent boundaries can lead to the formation of fold mountains.
(D) The movement of plates helps explain the global distribution of earthquakes.

57. Match the items in List I with those in List II.
List I: (Geomorphic Agent)
P. Gravity
Q. Water in cracks
R. Atmospheric Oxygen
S. Rainwater with CO_2
List II: (Associated Process)
1. Oxidation
2. Carbonation

3. Frost action
4. Mass wasting

Choose the correct answer from the options given below:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-1, S-2
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-3, R-4, S-1

58. What is the fundamental difference between the geomorphic models of Davis and Penck?
(A) Davis's model is evolutionary and time-dependent, while Penck's model focuses on the relationship between uplift and denudation rates.
(B) Penck assumed that uplift is a short, rapid event, while Davis assumed that it is a continuous process occurring throughout the entire cycle.
(C) Davis assumed uplift is a rapid event preceding a long period of stability, while Penck integrated uplift and denudation throughout the cycle.
(D) Davis focused exclusively on the concept of slope decline, while Penck's model emphasized the role of tectonic movements in shaping slopes.

59. A landslide differs from soil creep in that a landslide is:
(A) A much slower and less perceptible movement.
(B) Caused primarily by wind action.
(C) A much more rapid and often catastrophic movement.
(D) A form of chemical weathering.

60. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The Himalayas are an example of young fold mountains.
Reason (R) : They were formed by the collision of the Indian Plate with the Eurasian Plate.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

61. The large-scale supercontinent that existed before the continental drift began was named:
(A) Laurasia
(B) Gondwanaland
(C) Pangea
(D) Panthalassa

62. Which of the following is a key characteristic of the youthful stage in the Davisian Cycle of Erosion?
(A) V-shaped valleys
(B) Wide floodplains
(C) Meandering rivers
(D) Ox-bow lakes

63. Consider the following geological processes:
1. Folding
2. Faulting
3. Volcanism
4. Seismicity

Which of the above are considered 'sudden' endogenetic movements?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 3 only
(D) 2, 3 and 4 only

64. The theory of sea-floor spreading, a precursor to plate tectonics, was famously proposed by:
(A) Alfred Wegener
(B) Harry Hess
(C) W. M. Davis
(D) J. Tuzo Wilson

65. Oxidation, a process of chemical weathering, is most effective on rocks containing which mineral?
(A) Quartz
(B) Calcite
(C) Iron
(D) Feldspar

66. A geomorphic cycle, as conceptualized by W. M. Davis, is best defined as:
(A) The annual cycle of erosion and deposition in a river system.
(B) The period of time required for a landscape to pass through the stages of youth, maturity, and old age.
(C) The movement of tectonic plates over geological time.

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(D) The cyclical pattern of volcanic eruptions and earthquakes.

67. Consider the following statements:
Statement I : All geomorphic hazards are caused by endogenetic forces.
Statement II : Landslides can be triggered by exogenetic factors like heavy rainfall as well as endogenetic factors like earthquakes.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

68. An anticline is a type of fold that is:
(A) Down-arched, with younger rocks in the center.
(B) Up-arched, with older rocks in the center.
(C) A step-like bend in an otherwise horizontal rock layer.
(D) A fold that has been overturned to the point of being horizontal.

69. Which type of plate boundary is also known as a 'constructive' boundary because new crust is created there?
(A) Convergent boundary
(B) Transform boundary
(C) Divergent boundary
(D) Subduction zone

70. Arrange the following events in chronological order of their conceptual development:
1. Theory of Plate Tectonics
2. Theory of Continental Drift
3. Concept of Sea-Floor Spreading

Choose the correct option:
(A) 1, 2, 3
(B) 2, 3, 1
(C) 3, 1, 2
(D) 2, 1, 3

71. The 'Endrumpf' in Penck's model is analogous to which feature in Davis's model?
(A) Monadnock
(B) Peneplain
(C) V-shaped valley
(D) Waterfall

72. The rapid downslope movement of rock, debris, or earth under the influence of gravity is collectively known as:
(A) Weathering
(B) Mass Wasting
(C) Erosion
(D) Diastrophism

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73. The occurrence of deep-focus earthquakes is most commonly associated with:
(A) Mid-oceanic ridges
(B) Transform faults
(C) Subduction zones
(D) Volcanic hotspots

74. Consider the following statements about geomorphic cycles:
1. Davis's model is primarily applicable to humid temperate regions.
2. Penck's model gives more importance to the role of uplift.
3. Both models conclude with a low-relief erosional plain.
4. Davis's model is time-dependent, progressing through distinct stages.

Which of the above statements are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2, and 3 only
(D) 1, 2, 3 and 4

75. What is the fundamental difference between magma and lava?
(A) Magma is felsic, while lava is mafic.
(B) Magma is molten rock below the surface, while lava is molten rock on the surface.
(C) Magma forms intrusive rocks, while lava forms metamorphic rocks.
(D) Magma is hotter than lava.

76. Which of the following is NOT a form of physical weathering?
(A) Thermal stress
(B) Frost wedging
(C) Salt crystal growth
(D) Carbonation

77. The concept that lithospheric plates are in a state of gravitational equilibrium, floating on the asthenosphere, is known as:
(A) Diastrophism

(B) Orogeny
(C) Isostasy
(D) Epeirogeny

78. Which of the following geomorphic hazards is NOT directly caused by plate tectonics?
(A) Earthquakes at plate boundaries
(B) Volcanic eruptions at subduction zones
(C) Avalanches in high mountain regions
(D) Tsunamis generated by undersea earthquakes

79. Consider the following statements:
Statement I : Endogenetic forces are tensional forces, while exogenetic forces are compressional forces.
Statement II : Folding is caused by tensional forces, and faulting is caused by compressional forces.
Which of the following is correct?
(A) Both Statement I and Statement II are false.
(B) Both Statement I and Statement II are true.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

80. A reverse fault, where the hanging wall has moved up relative to the footwall, is the result of:
(A) Tensional stress
(B) Compressional stress
(C) Shear stress
(D) Hydrostatic stress

81. Which of the following is a characteristic feature of a landscape in the 'old age' stage of the Davisian cycle?
(A) Rapid vertical downcutting and the formation of V-shaped valleys by rivers.
(B) Presence of numerous waterfalls and rapids along the entire course of the stream.
(C) A well-developed, integrated drainage network with maximum possible relief.
(D) Broad, sluggishly meandering rivers and ox-bow lakes on a low-relief plain.

82. Consider the following pairs of processes and landforms:
1. Subduction - Trench
2. Sea-floor spreading - Mid-Oceanic Ridge
3. Continental Collision - Fold Mountains
4. Transform Movement - Rift Valley
5. Hotspot Volcanism - Volcanic Island Chain

Which of the above pairs are correctly matched?
(A) 1, 2, 3, and 5
(B) 1, 3, and 4
(C) 2, 4, and 5
(D) 1, 2, 3, 4, and 5

83. The failure of Wegener's Continental Drift theory among the scientific community of his time was primarily due to his inability to:
(A) Provide a detailed mathematical proof for the 'jig-saw' fit of the coastlines.
(B) Provide sufficient fossil evidence to satisfy the broader biological community.
(C) Propose a credible mechanism for the movement of continents through the sea floor.
(D) Show physical evidence of past glaciations occurring within modern tropical regions.

84. The process of denudation includes all of the following, except:
(A) Weathering
(B) Orogeny
(C) Mass wasting
(D) Erosion

85. Which of the following best describes the process of vulcanicity?
(A) The slow uplift and downwarp of continental masses.
(B) The fracturing and displacement of rocks along a fault plane.
(C) The set of processes involving the movement and solidification of magma.
(D) The disintegration of rocks at or near the Earth's surface.

86. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The theories of slope development by Davis, Penck, and King offer different explanations for how hillslopes evolve over time.
Reason (R) : The primary difference lies in their assumptions about the relationship between uplift and denudation, leading to concepts like slope decline, replacement, and parallel retreat.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

87. What is a 'graben'?
(A) An up-faulted block mountain.
(B) A down-dropped block of land between two normal faults.
(C) The upper limb of an anticline.
(D) A large intrusive igneous body.

88. The most significant contribution of the Plate Tectonics theory is that it:
(A) Proved that the Earth's core is solid.
(B) Provided a unified explanation for diverse geological phenomena like earthquakes, volcanoes, and mountain building.
(C) Was the first theory to suggest that continents move.
(D) Explained the formation of sedimentary rocks.

89. Which of the following is an example of a geomorphic hazard triggered by an endogenetic process but manifested as an exogenetic process?
(A) A volcanic eruption causing a lava flow.
(B) An earthquake causing a building to collapse.
(C) An earthquake triggering a massive landslide.
(D) A fault scarp forming during an earthquake.

90. Match the items in List I with those in List II.
List I: (Term from Davisian Cycle)
P. Youth
Q. Maturity
R. Old Age
S. Monadnock
List II: (Description)
1. Maximum relief, well-integrated drainage
2. Featureless plain with sluggish streams
3. V-shaped valleys, river capture
4. Residual hill on a peneplain
Choose the correct answer from the options given below:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

91. Which of the following is an intrusive volcanic landform?
(A) Caldera
(B) Cinder cone
(C) Lava plateau
(D) Laccolith

92. The concept of "Structure, Process and Stage" is the cornerstone of the geomorphic theory proposed by:
(A) Walther Penck
(B) L. C. King
(C) W. M. Davis
(D) Harry Hess

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93. The primary difference between endogenetic and exogenetic forces is their:
(A) Speed of operation
(B) Origin
(C) Effect on rock type
(D) Geographical location of impact

94. Which of these statements about slope development is correct?
(A) Davis' theory proposes parallel retreat of slopes.
(B) Penck's theory suggests that slope form is independent of the rate of uplift.
(C) King's theory of pediplanation involves the parallel retreat of scarps.
(D) All theories agree that slopes become progressively gentler over time.

95. In plate tectonics, what happens at a continental-oceanic convergent boundary?
(A) The continental plate subducts beneath the oceanic plate.
(B) The oceanic plate subducts beneath the continental plate.
(C) The two plates slide past each other horizontally.
(D) The two plates move apart, creating a rift.

96. Consider the following statements related to weathering:
1. Physical weathering involves the breakdown of rocks without changing their chemical composition.
2. Chemical weathering involves the decomposition of rocks through chemical reactions.

3. Biological weathering can be either physical or chemical in nature.
4. Weathering is the movement of rock debris from one place to another.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) 1, 2, 3 and 4

97. An avalanche is a major hazard in mountainous regions. Its occurrence is primarily related to:
(A) The frequency of volcanic eruptions in the region.
(B) The presence of strike-slip faults.
(C) The angle of the slope and the stability of the snowpack.
(D) The rate of chemical weathering.

98. Consider the following statements:
Statement I : Diastrophic forces are slow and long-acting, responsible for creating large-scale relief features like mountains and plateaus.
Statement II : Earthquakes and volcanoes are examples of diastrophic forces.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

99. The study of the causes and distribution of earthquakes is known as:
(A) Vulcanology
(B) Geomorphology
(C) Seismicity
(D) Petrology

100. In Penck's geomorphic model, 'gleichformige entwicklung' represents a state where:
(A) The rate of uplift exceeds the rate of erosion.
(B) The landscape is static with no uplift or erosion.
(C) The rate of uplift is balanced by the rate of erosion, leading to constant slope forms.
(D) Erosion dominates over uplift, leading to a decrease in relief.

101. Which of the following is NOT a direct landform result of faulting?
(A) Rift Valley
(B) Block Mountain (Horst)
(C) Fault Scarp
(D) Syncline

102. Which of the following theories provides the most comprehensive explanation for the formation of the Mid-Atlantic Ridge?
(A) Continental Drift
(B) Geomorphic Cycle of Davis
(C) Plate Tectonics
(D) Denudation Chronology

103. The term 'denudation' encompasses a group of processes. Which of the following represents the correct group?
(A) Folding, Faulting, Vulcanicity
(B) Weathering, Mass Wasting, Erosion
(C) Diastrophism, Seismicity, Orogeny
(D) Subduction, Spreading, Transformation

104. Consider the following geological features and processes:
1. Fold Mountains
2. Volcanic Arcs
3. Deep-Sea Trenches
4. Earthquakes
5. Island Arcs

Which of the above are typically associated with convergent plate boundaries?
(A) 1, 2, and 4 only
(B) 2, 3, and 5 only
(C) 1, 3, 4 and 5 only
(D) 1, 2, 3, 4, and 5

105. The breakdown of rock by the repeated freezing and thawing of water in cracks is called:
(A) Hydrolysis
(B) Exfoliation
(C) Frost Action or Frost Wedging
(D) Hydration

106. In the context of the Davisian cycle, what is the 'base level of erosion'?
(A) The highest elevation in a given landscape.
(B) The theoretical lowest limit to which a landscape can be eroded, often sea level.
(C) The average elevation of a mature landscape.
(D) The initial elevation of the landmass before erosion begins.

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107. Which of the following correctly describes a normal fault?
(A) It results from compressional forces, causing the hanging wall to move up.
(B) It results from tensional forces, causing the hanging wall to move down.
(C) It involves horizontal movement of blocks past each other.
(D) It is a type of fold, not a fault.

108. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Landslides are more common on steep slopes with weak, unconsolidated materials.
Reason (R) : Gravity exerts a stronger downward force on steeper slopes, and weak materials have low shear strength, making them more susceptible to failure.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

109. Which of the following is an example of an exogenetic process?
(A) Formation of a batholith
(B) Formation of a river delta
(C) Formation of a fold mountain
(D) An earthquake

110. A key difference between Wegener's Continental Drift theory and the theory of Plate Tectonics is that:
(A) Plate tectonics applies only to oceans, while continental drift applies only to continents.
(B) Wegener believed continents moved, while plate tectonics theory holds that entire lithospheric plates move.
(C) Continental drift is driven by convection currents, while plate tectonics is driven by tidal forces.
(D) Plate tectonics does not accept the evidence of fossil distribution that Wegener used.

111. Consider the following statements:
Statement I : In Walther Penck's model, the morphology of a slope is a direct reflection of the intensity of denudation relative to uplift.
Statement II : A convex slope profile develops when the rate of uplift is accelerating.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

112. The most destructive type of seismic waves, which travel along the Earth's surface, are known as:
(A) P-waves
(B) S-waves
(C) L-waves (Surface waves)
(D) Body waves

113. Match the items in List I with those in List II.
List I: (Geomorphic Hazard)
P. Earthquake
Q. Volcano
R. Landslide
S. Avalanche
List II: (Primary Cause/Mechanism)
1. Extrusion of magma
2. Sudden release of energy along a fault
3. Rapid movement of snow and ice
4. Slope failure due to gravity
Choose the correct answer from the options given below:
(A) P-2, Q-1, R-4, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-4, R-1, S-3
(D) P-3, Q-1, R-4, S-2

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114. The process by which rocks and soil are worn away and transported by natural agents like wind, water, or ice is called:
(A) Weathering
(B) Erosion
(C) Denudation
(D) Mass wasting

115. A key argument against Wegener's Continental Drift theory was that the proposed 'pole-fleeing force':
(A) Was far too strong to be realistic given the size of the Earth.
(B) Could only move continents east-west, not north-south across the crust.

(C) Was considered mathematically insufficient to move massive continental masses.
(D) Was not consistent with the geological evidence of diverse rock types.

116. Which of the following is a landform of volcanic origin?
(A) A moraine
(B) An esker
(C) A caldera
(D) A drumlin

117. Which of the following terms from Penck's model describes the phase of declining uplift, where erosion overtakes uplift and relief decreases?
(A) Aufsteigende entwicklung
(B) Gleichformige entwicklung
(C) Absteigende entwicklung
(D) Primarrumpf

118. Which statement best defines the relationship between weathering and erosion?
(A) Weathering and erosion are two words for the same process.
(B) Weathering is the transport of rock, while erosion is its breakdown.
(C) Weathering is the breakdown of rock, while erosion is the transport of the resulting debris.
(D) Weathering is a chemical process, while erosion is a physical process.

119. Consider the following statements about geomorphic forces:
1. Endogenetic forces are mainly land-building forces.
2. Exogenetic forces are mainly land-wearing forces.
3. Diastrophism is an exogenetic process.
4. Erosion is an endogenetic process.

Which of the above statements are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1 and 3
(D) 2 and 4

120. Arrange the following intrusive volcanic landforms in order of generally increasing size (from smallest to largest):
1. Batholith
2. Laccolith
3. Dyke

Choose the correct option:
(A) 1, 2, 3
(B) 3, 2, 1
(C) 2, 3, 1
(D) 3, 1, 2

121. The San Andreas Fault in California is a classic example of which type of plate boundary?
(A) Convergent
(B) Divergent
(C) Transform
(D) Subduction

122. A region is dominated by limestone topography with features like sinkholes and caves. This is a result of which specific chemical weathering process?
(A) Oxidation
(B) Hydrolysis
(C) Hydration
(D) Carbonation-Solution

123. The 'youthful' stage of the geomorphic cycle of Davis is characterized by:
(A) A peneplain
(B) Maximum relief
(C) Vigorous vertical erosion by rivers
(D) Lateral erosion and floodplain development

124. Consider the following factors:
1. Steepness of slope
2. Type of rock material
3. Amount of water saturation
4. Presence of vegetation
5. Seismic activity

Which of these factors influence the occurrence of landslides?
(A) 1, 2 and 3 only
(B) 1, 4 and 5 only
(C) 2, 3 and 4 only
(D) 1, 2, 3, 4 and 5

125. Which one of the following is NOT an evidence used by Alfred Wegener to support his theory of continental drift?
(A) Jig-saw fit of continents
(B) Fossil distribution across continents
(C) Palaeomagnetic data from the ocean floor
(D) Geological and structural similarities

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between continents

126. A large, discordant, intrusive igneous body of irregular shape that has no known floor is a:
(A) Sill
(B) Dyke
(C) Laccolith
(D) Batholith

127. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The theories of Continental Drift and Plate Tectonics both deal with the large-scale movement of Earth's landmasses.
Reason (R) : Plate Tectonics is essentially a more developed and scientifically supported version of the initial ideas proposed in the Continental Drift theory.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

128. Which of the following is an example of a 'sudden' endogenetic force?
(A) Orogenesis
(B) Epeirogenesis
(C) Weathering
(D) Vulcanicity

129. The concept of 'parallel retreat' of slopes is a key component of the pediplanation cycle proposed by:
(A) W. M. Davis
(B) Walther Penck
(C) L. C. King
(D) G. K. Gilbert

130. Consider the following statements:
Statement I : A fold is a bend in rock strata, while a fault is a fracture with displacement.
Statement II : Both folds and faults are landforms created exclusively by exogenetic forces.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

131. The formation of the Hawaiian Islands is a classic example of volcanism associated with a:
(A) Divergent plate boundary
(B) Convergent plate boundary
(C) Transform fault
(D) Mantle plume or 'hotspot'

132. Match the items in List I with those in List II.
List I: (Slope Development Concept)
P. Slope Decline
Q. Slope Replacement
R. Parallel Retreat
S. Pediplanation
List II: (Associated Proponent)
1. Walther Penck
2. L. C. King
3. W. M. Davis
4. L. C. King (also)
Choose the correct answer from the options given below:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

133. The 'Tethys Sea' is a significant feature in the context of Continental Drift and Plate Tectonics because it:
(A) Was the super-ocean surrounding Pangea.
(B) Separated the continents of Laurasia and Gondwanaland.
(C) Is the modern-day Atlantic Ocean.
(D) Was the sea from which the Pacific Ocean basin formed.

134. Which of these pairs is incorrectly matched?
(A) Endogenetic Force - Mountain building
(B) Exogenetic Force - Denudation
(C) Endogenetic Force - Weathering
(D) Exogenetic Force - Erosion

135. What is the most appropriate term for the wearing away of the land surface by natural physical and chemical processes?
(A) Vulcanicity
(B) Diastrophism
(C) Denudation
(D) Orogeny

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136. A key feature of the mature stage of Davis's geomorphic cycle is the:
(A) Dominance of V-shaped valleys and rapids.
(B) Disappearance of interfluves and a nearly flat landscape.
(C) Achievement of maximum relief and a well-integrated drainage network.
(D) Initial uplift of the landmass.

137. Which of the following geomorphic hazards is fundamentally a problem of slope instability?
(A) Earthquakes
(B) Volcanic eruptions
(C) Landslides
(D) Tsunamis

138. Consider the following statements about forces shaping the Earth's surface:
1. Endogenetic forces generally create relief.
2. Exogenetic forces generally reduce relief.
3. Tectonic movements are exogenetic.
4. Glacial erosion is endogenetic.

Which of the above statements are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1 and 4
(D) 2 and 3

139. The theory of Plate Tectonics successfully explains all of the following EXCEPT:
(A) The formation of the Himalayas.
(B) The origin of mid-oceanic ridges.
(C) The cause of the Earth's magnetic field.
(D) The distribution of volcanoes around the Pacific Ocean.

140. A type of fold in which the axial plane is nearly horizontal is known as a:
(A) Symmetrical fold
(B) Asymmetrical fold
(C) Overturned fold
(D) Recumbent fold

141. The final, near-featureless erosional surface in the Davisian model is a _____, while in Penck's model it is a(n) _____.
(A) Endrumpf; Peneplain
(B) Peneplain; Endrumpf
(C) Pediplain; Primarrumpf
(D) Primarrumpf; Pediplain

142. The occurrence of major earthquakes is strongly correlated with:
(A) The boundaries of lithospheric plates.
(B) The centers of continental shields.
(C) The locations of major river deltas.
(D) Areas of deep ocean basins.

143. Which of the following is a process of chemical weathering?
(A) Granular disintegration due to temperature changes.
(B) Rock splitting by plant roots.
(C) The reaction of water with minerals in a rock, forming new compounds (hydrolysis).
(D) The abrasion of rock by wind-borne sand.

144. Consider the following statements regarding Earth Movements:
1. Folding results from compressional forces.
2. Normal faulting results from tensional forces.
3. A graben is a raised block of land.
4. An anticline is a down-fold.
5. Vulcanicity is an exogenetic process.

Which of the above statements are correct?
(A) 1 and 2
(B) 3, 4 and 5
(C) 1, 2 and 4
(D) 3 and 5

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145. "The present is the key to the past" is a fundamental principle of geology that is essential for interpreting geomorphic history. This principle is known as:
(A) Catastrophism
(B) Uniformitarianism
(C) Continental Drift
(D) Superposition

146. A laccolith, a lopolith, and a sill are all examples of:
(A) Extrusive volcanic landforms
(B) Erosional landforms
(C) Intrusive volcanic landforms
(D) Fault-related landforms

147. Which of the following statements about Walther Penck's model is INCORRECT?
(A) It describes landscape evolution as a function of the ratio between uplift and denudation rates.

(B) It proposes three main phases of development: aufsteigende, gleichformige, and absteigende entwicklung.
(C) It assumes that uplift is a rapid, initial event followed by a long period of quiescence.
(D) It uses slope form (convex, straight, concave) as an indicator of the nature of uplift.

148. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Denudation is a comprehensive term covering all processes of wearing away of the Earth's surface.
Reason (R) : Denudation includes weathering, which is the in-situ breakdown of rocks, and erosion, which involves the removal and transport of weathered material.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

149. The movement of lithospheric plates is thought to be driven primarily by:
(A) The gravitational pull of the moon and sun.
(B) Convection currents within the Earth's mantle.
(C) The rotation of the Earth (Coriolis effect).
(D) The weight of accumulating ice sheets at the poles.

150. A major geomorphic hazard associated with snow-covered, steep mountain slopes is:
(A) A landslide
(B) A lahar
(C) An avalanche
(D) A pyroclastic flow

151. Consider the following statements:
Statement I : The concept of a 'geomorphic cycle' implies an orderly sequence of landform development over time.
Statement II : W. M. Davis proposed a time-dependent cycle, whereas Walther Penck proposed a time-independent model where slope form reflects the balance of forces.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

152. Block mountains (horsts) and rift valleys (grabens) are characteristic landforms of:
(A) Folding
(B) Faulting
(C) Vulcanicity
(D) Denudation

153. Match the items in List I with those in List II.
List I: (Tectonic Plate Boundary)
P. Divergent
Q. Convergent (Oceanic-Continental)
R. Convergent (Continental-Continental)
S. Transform
List II: (Characteristic Feature/Example)
1. Himalayas
2. San Andreas Fault
3. Mid-Atlantic Ridge
4. Andes Mountains
Choose the correct answer from the options given below:
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-4, Q-3, R-2, S-1

154. What is the defining characteristic of a 'peneplain'?
(A) It is a landscape of high relief and steep slopes.
(B) It is a depositional plain formed by a river.
(C) It is an erosional surface of low relief, formed near the end of a cycle of erosion.
(D) It is a plateau created by volcanic lava flows.

155. Which of the following is not a type of fault?
(A) Normal
(B) Reverse
(C) Strike-slip
(D) Recumbent

156. The theory of continental drift proposed that all continents were once joined together in a supercontinent called:
(A) Panthalassa
(B) Tethys
(C) Laurasia

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(D) Pangea

157. The primary trigger for most large-scale landslides is often:
(A) Excessive heat from the sun.
(B) Strong winds during a storm.
(C) Saturation of slope materials by intense or prolonged rainfall.
(D) Gradual chemical weathering of bedrock.

158. Which of the following statements correctly distinguishes between endogenetic and exogenetic forces?
(A) Endogenetic forces are always slow, while exogenetic forces are always rapid.
(B) Endogenetic forces originate within the Earth, while exogenetic forces originate at or near the surface.
(C) Endogenetic forces cause erosion, while exogenetic forces cause mountain building.
(D) Endogenetic forces are driven by solar energy, while exogenetic forces are driven by Earth's internal heat.

159. The concept of 'slope decline', where hillslopes become gentler over time, is central to the model of:
(A) W. M. Davis
(B) Walther Penck
(C) L. C. King
(D) A. N. Strahler

160. Consider the following statements about vulcanicity:
1. It includes all phenomena connected with the movement of molten rock from the interior to the surface.
2. Extrusive vulcanicity results in landforms like sills and dykes.
3. Intrusive vulcanicity results in landforms like lava flows and volcanoes.
4. Composite volcanoes are formed from alternating layers of lava and pyroclastics.

Which of the above statements are correct?
(A) 1 and 4
(B) 2 and 3
(C) 1, 2 and 3
(D) 2, 3 and 4

161. A person observes a landscape with deep, V-shaped valleys, many rapids and waterfalls, and poorly developed floodplains. According to the Davisian model, this landscape is in which stage of the geomorphic cycle?
(A) Old Age
(B) Maturity
(C) Youth
(D) Peneplanation

162. The theory of Plate Tectonics is a synthesis of which two earlier ideas?
(A) Continental Drift and Isostasy
(B) Continental Drift and Sea-Floor Spreading
(C) Sea-Floor Spreading and Geomorphic Cycle
(D) Isostasy and Denudation

163. Which type of earth movement is responsible for the formation of fold mountains like the Alps and the Himalayas?
(A) Epeirogenic movements
(B) Orogenic movements
(C) Isostatic movements
(D) Exogenetic movements

164. The slow, gradual downslope movement of soil and regolith is known as:
(A) Landslide
(B) Avalanche
(C) Mudflow
(D) Soil creep

165. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Alfred Wegener's Continental Drift theory was initially rejected by most geologists.
Reason (R) : Wegener could not provide a convincing mechanism to explain how continents could move through the rigid ocean floor.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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166. A mushroom-shaped intrusive igneous body that has domed up the overlying strata is a:
(A) Lopolith

(B) Phacolith
(C) Batholith
(D) Laccolith

167. Which of the following is NOT a geomorphic hazard?
(A) Earthquake
(B) Peneplanation
(C) Landslide
(D) Volcanic Eruption

168. Consider the following statements:
Statement I : Chemical weathering is the most dominant form of weathering in polar regions.
Statement II : Physical weathering, such as frost action, is the most dominant form of weathering in hot, tropical regions.
Which of the following is correct?
(A) Both Statement I and Statement II are false.
(B) Both Statement I and Statement II are true.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

169. The 'Primarrumpf' is a concept in Penck's model that refers to:
(A) The final, low-relief plain.
(B) The initial land surface before uplift begins.
(C) A slope of constant angle during uniform development.
(D) The steepest part of a waxing slope.

170. Arrange the following plate tectonic features in an idealized sequence from a spreading center outwards to a subduction zone:
1. Deep-sea trench
2. Mid-ocean ridge
3. Abyssal plain

Choose the correct option:
(A) 2, 3, 1
(B) 1, 3, 2
(C) 3, 2, 1
(D) 2, 1, 3

171. A fault in which the displacement is primarily horizontal is known as a:
(A) Normal fault
(B) Reverse fault
(C) Thrust fault
(D) Strike-slip fault

172. The driving force for all exogenetic geomorphic processes is ultimately:
(A) Geothermal heat from the Earth's interior
(B) Gravity and solar energy
(C) The Earth's rotation
(D) Tectonic plate movement

173. In the Davisian cycle, what are 'monadnocks'?
(A) V-shaped valleys characteristic of the youth stage.
(B) The flat-topped divides of the mature stage.
(C) Isolated, erosion-resistant hills rising above a peneplain in the old age stage.
(D) Ox-bow lakes formed by meandering rivers.

174. Consider the following characteristics of geomorphic theories:
1. Focuses on time-dependent stages: Youth, Maturity, Old Age.
2. Emphasizes the relationship between rates of uplift and denudation.
3. Proposes the concept of slope replacement (hangdenhang and haldenhang).
4. Concludes with a 'peneplain' dotted with monadnocks.
5. Describes slope evolution through 'aufsteigende', 'gleichformige', and 'absteigende' phases.

Which of the above characteristics are associated with Walther Penck's model?
(A) 1 and 4
(B) 2, 3 and 5
(C) 1, 4 and 5
(D) 2 and 4 only

175. The formation of the Andes Mountains is a result of which type of plate interaction?
(A) Collision of two oceanic plates.
(B) Collision of two continental plates.
(C) Subduction of an oceanic plate beneath a continental plate.
(D) Movement along a transform fault.

176. Which of the following is an incorrect pairing of a process and its category?
(A) Folding - Endogenetic
(B) Erosion - Exogenetic
(C) Vulcanism - Endogenetic
(D) Weathering - Endogenetic

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177. A volcano that is built up by highly viscous, silica-rich lava that does not travel far, resulting in a steep-sided cone, is likely a:
(A) Shield volcano
(B) Cinder cone
(C) Composite or Stratovolcano
(D) Lava dome

178. The primary cause of seismicity (earthquakes) is:
(A) The collapse of underground caverns.
(B) The sudden release of accumulated stress along a fault.
(C) Volcanic explosions.
(D) Large-scale landslides.

179. Consider the following statements:
Statement I : The theory of Plate Tectonics states that the Earth's lithosphere is a single, unbroken shell.
Statement II : The theory of Plate Tectonics explains the formation of mid-oceanic ridges as zones where plates are pulling apart.
Which of the following is correct?
(A) Both Statement I and Statement II are false.
(B) Both Statement I and Statement II are true.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

180. The disintegration of granite into a mass of sand-like grains due to the differential expansion and contraction of its constituent minerals is an example of:
(A) Chemical solution
(B) Granular disintegration
(C) Exfoliation
(D) Frost shattering

181. What term describes the broad, regional-scale uplift or depression of the Earth's crust without significant folding or faulting?
(A) Orogeny
(B) Epeirogeny
(C) Seismicity
(D) Vulcanicity

182. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Exfoliation domes, like those in Yosemite, are formed by the peeling away of large, curved sheets of rock.
Reason (R) : This process, also known as unloading, occurs as overlying rock is eroded away, reducing pressure on the underlying rock and allowing it to expand and fracture in layers parallel to the surface.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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183. Which of the following is a process of mass wasting?
(A) Abrasion by wind
(B) Dissolution by groundwater
(C) Rockfall
(D) Plucking by a glacier

184. The concept of a geomorphic cycle is criticized by modern geomorphologists primarily because:
(A) It fails to recognize the role of climate.
(B) It assumes a simple, uninterrupted progression that is rare in nature due to tectonic and climatic complexities.
(C) It only applies to volcanic landscapes.
(D) It does not account for the process of weathering.

185. Match the items in List I with those in List II.
List I: (Landform)
P. Rift Valley
Q. Volcanic Island Arc
R. Fold Mountains
S. Mid-Oceanic Ridge
List II: (Associated Tectonic Setting)
1. Convergent Boundary (Oceanic-Oceanic)
2. Convergent Boundary (Continental-Continental)
3. Divergent Boundary (Continental)
4. Divergent Boundary (Oceanic)
Choose the correct answer from the options given below:
(A) P-3, Q-1, R-2, S-4
(B) P-4, Q-2, R-1, S-3
(C) P-3, Q-2, R-1, S-4
(D) P-1, Q-3, R-4, S-2

186. Which of the following geomorphic hazards is directly associated with vulcanicity?
(A) An avalanche
(B) A pyroclastic flow
(C) A strike-slip fault
(D) A soil creep

187. The total effect of all processes that lower the surface of the continents is known as:
(A) Aggradation
(B) Diastrophism
(C) Denudation
(D) Tectonism

188. In the context of Earth movements, compressional forces are most likely to result in:
(A) Normal faults and rift valleys.
(B) Folds and reverse faults.
(C) Strike-slip faults and transform boundaries.
(D) Epeirogenic uplift.

189. Which of the following is a key feature of the 'mature stage' in Davis's cycle of erosion?
(A) The dominance of vertical erosion.
(B) The presence of a peneplain.
(C) The disappearance of most waterfalls and rapids.
(D) The initial phase of river development.

190. Consider the following statements:
1. Diastrophism and volcanism are endogenetic geomorphic processes.
2. Weathering and erosion are exogenetic geomorphic processes.
3. Diastrophism refers to slow movements of the Earth's crust.
4. Volcanism is considered a sudden movement.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) 1, 2, 3 and 4

191. The location of volcanic activity is strongly correlated with all of the following EXCEPT:
(A) Divergent plate boundaries
(B) Convergent plate boundaries (subduction zones)
(C) Mant hotspots
(D) The centers of stable continental shields

192. Which slope development theory emphasizes the concept of 'pediplanation', where pediments expand at the expense of mountain masses?
(A) Davis's Geomorphic Cycle
(B) Penck's Morphological Analysis
(C) King's Pediplanation Cycle
(D) Gilbert's Dynamic Equilibrium

193. Consider the following statements:
Statement I : Faulting is a brittle deformation of the Earth's crust.
Statement II : Folding is a ductile (plastic) deformation of the Earth's crust.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

194. The breakup of Pangea led to the formation of two large continents, Laurasia in the north and _____ in the south.
(A) Panthalassa
(B) Tethys
(C) Gondwanaland
(D) Rodinia

195. Landslides, avalanches, rockfalls, and soil creep are all types of what geomorphic process?
(A) Vulcanicity
(B) Fluvial Erosion
(C) Mass Wasting
(D) Diastrophism

196. What is the fundamental assumption made by W. M. Davis about uplift in his geomorphic cycle?
(A) Uplift is slow and continuous throughout the entirety of the geomorphic cycle.
(B) Uplift rate varies significantly and determines the specific form of the slope.
(C) Uplift is a rapid, short-lived event that is completed before erosion begins.
(D) Uplift is a minor factor that does not occur within the scope of his model.

197. Which of the following is the best example of a landform created by exogenetic forces?
(A) A volcanic cone
(B) A river meander
(C) A fault scarp

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(D) An anticline

198. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The Atlantic Ocean is widening.
Reason (R) : The Mid-Atlantic Ridge is a divergent plate boundary where new oceanic crust is being formed through sea-floor spreading.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

199. A reverse fault with a very low angle of dip for the fault plane is known as a:
(A) Normal fault
(B) Graben
(C) Horst
(D) Thrust fault

200. Match the items in List I with those in List II.
List I: (Phenomenon)
P. Peneplain
Q. Endrumpf
R. Pangea
S. Sea-floor spreading
List II: (Associated Theory/Concept)
1. Continental Drift
2. Plate Tectonics
3. Davis's Geomorphic Cycle
4. Penck's Morphological Analysis
Choose the correct answer from the options given below:
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-4, Q-3, R-2, S-1

201. The East African Rift Valley is a prime example of landforms being created at a:
(A) Convergent continental boundary
(B) Divergent continental boundary
(C) Oceanic subduction zone
(D) Transform fault boundary

202. The chemical union of water with minerals in a rock to form new compounds is known as:
(A) Carbonation
(B) Oxidation
(C) Hydrolysis
(D) Solution

203. Which of the following characteristics is NOT associated with the 'youth' stage of the Davisian cycle?
(A) Steep valley-side slopes
(B) River capture
(C) Broad floodplains
(D) V-shaped valleys

204. Consider the following landforms:
1. Rift Valley
2. Anticline
3. Volcanic Cone
4. Horst
5. Syncline
Which of the above are created by endogenetic forces?
(A) 1, 2, and 3 only
(B) 2, 4, and 5 only
(C) 1, 3, and 4 only
(D) 1, 2, 3, 4, and 5

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205. The primary difference between a landslide and an avalanche is the material involved. A landslide primarily involves _____, while an avalanche involves _____.
(A) rock and soil; snow and ice
(B) ice; rock
(C) water; mud
(D) snow; soil

206. Which of the following is considered an exogenetic force?
(A) Folding
(B) Faulting
(C) Action of wind
(D) Vulcanicity

207. Consider the following statements:
Statement I : The theory of plate tectonics provides a framework for understanding the occurrence of most earthquakes and volcanic eruptions.
Statement II : These geomorphic hazards are concentrated randomly across the globe, with

no relation to plate boundaries.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

208. The up-arched part of a fold is known as a(n) _____, while the down-arched part is a(n) _____.
(A) graben; horst
(B) horst; graben
(C) syncline; anticline
(D) anticline; syncline

209. In Penck's model of landscape evolution, a 'waxing' or convex slope profile indicates that:
(A) The rate of uplift is accelerating.
(B) The rate of uplift is constant.
(C) The rate of uplift is decelerating.
(D) There is no uplift, only down-wasting.

210. Which of the following is an example of physical weathering?
(A) Dissolving of limestone by acidic water.
(B) Rusting of iron-rich minerals.
(C) Splitting of a rock by a tree root.
(D) Formation of clay minerals from feldspar.

211. The Pacific 'Ring of Fire' is a term that describes the distribution of:
(A) Coral reefs in the Pacific Ocean.
(B) Major shipping lanes.
(C) Volcanoes and earthquakes around the Pacific Ocean basin.
(D) A chain of ancient, submerged mountains.

212. A key tenet of W.M. Davis's 'Geographical Cycle' is that landscapes evolve through a sequence of:
(A) Structure, Climate, and Time
(B) Uplift, Subsidence, and Stasis
(C) Structure, Process, and Stage
(D) Weathering, Erosion, and Deposition

213. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Endogenetic forces are stress-inducing forces, while exogenetic forces are stress-releasing.
Reason (R) : Endogenetic forces build up potential energy in the form of relief, which exogenetic forces then act upon to release, lowering the landscape.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

214. Which process is NOT part of denudation?
(A) Weathering
(B) Tectonics
(C) Mass movement
(D) Erosion

215. A volcanic eruption that ejects a deadly, fast-moving cloud of superheated gas, ash, and rock fragments is known as a:
(A) Lahar
(B) Lava flow
(C) Pyroclastic flow
(D) Fissure eruption

216. Consider the following statements about faulting:
1. Normal faults are caused by tensional forces.
2. Reverse faults are caused by compressional forces.
3. Strike-slip faults involve horizontal displacement.
4. A horst is a down-dropped block.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) 1, 2, 3 and 4

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217. The primary distinction between continental drift and plate tectonics is that the latter:
(A) Applies only to the Southern Hemisphere.
(B) Involves the movement of rigid lithospheric plates rather than just continents.
(C) Was proposed much earlier.
(D) Rejects the idea of a supercontinent.

218. The 'maturity' stage in the Davisian cycle is best characterized by:
(A) A featureless plain near base level.
(B) The onset of downcutting in a newly uplifted

block.
(C) The greatest relief differentiation and a highly integrated drainage system.
(D) The presence of numerous isolated monadnocks.

219. Which of the following pairs is incorrectly matched?
(A) Davis - Slope Decline
(B) Penck - Slope Replacement
(C) King - Parallel Retreat
(D) Davis - Slope Replacement

220. Arrange the following processes of denudation in the logical sequence they generally occur:
1. Transportation
2. Weathering
3. Erosion (entrainment)

Choose the correct option:
(A) 1, 2, 3
(B) 2, 3, 1
(C) 3, 1, 2
(D) 2, 1, 3

221. A geomorphic hazard that involves the rapid movement of a mixture of water and volcanic debris down the slopes of a volcano is called a:
(A) Pyroclastic flow
(B) Lava flow
(C) Lahar
(D) Landslide

222. The term 'isostasy' refers to the principle of gravitational equilibrium between the Earth's:
(A) Core and mantle
(B) Lithosphere and asthenosphere
(C) Continents and oceans
(D) Atmosphere and hydrosphere

223. In the context of vulcanicity, a 'dyke' is a:
(A) Sheet-like intrusion that is concordant with the bedding of the host rock.
(B) Sheet-like intrusion that cuts across the bedding of the host rock.
(C) Massive, deep-seated intrusion of irregular shape.
(D) Mushroom-shaped intrusion.

224. Which of the following forces did Wegener propose as a mechanism for continental drift?
(A) Convection currents in the mantle
(B) Pole-fleeing force and tidal forces
(C) Sea-floor spreading
(D) Ridge-push and slab-pull

225. A landscape is observed to have a number of steep-sided, flat-topped mountains (mesas and buttes) with intervening pediments that are gradually expanding. This landscape is evolving according to the principles of slope development proposed by:
(A) W. M. Davis
(B) L. C. King
(C) Walther Penck
(D) G. K. Gilbert

226. Consider the following statements:
Statement I : Endogenetic forces are responsible for creating initial irregularities on the Earth's surface.
Statement II : Exogenetic forces act upon these irregularities to continuously modify and reduce them.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

227. The point within the earth where an earthquake rupture starts is the _____, and the point directly above it on the surface is the _____.
(A) epicenter; focus
(B) hypocenter; epicenter
(C) fault scarp; focus
(D) epicenter; hypocenter

228. The formation of soil is a direct result of which geomorphic process?
(A) Diastrophism
(B) Vulcanicity
(C) Weathering
(D) Folding

229. Match the items in List I with those in List II.
List I: (Term)
P. Anticline
Q. Graben
R. Denudation
S. Caldera
List II: (Definition)
1. A large basin-shaped depression formed by

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the collapse of a volcano.
2. The overall process of lowering the Earth's surface through weathering and erosion.
3. A down-dropped block of land between two faults.
4. An up-fold in rock layers.

Choose the correct answer from the options given below:
(A) P-4, Q-3, R-2, S-1
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-3, R-4, S-1

230. A key piece of evidence for sea-floor spreading is:
(A) The similar shapes of coastlines on opposite sides of the Atlantic.
(B) The age of the oceanic crust increases with distance from the mid-ocean ridges.
(C) The presence of glacial deposits in tropical areas.
(D) The discovery of identical fossils on different continents.

231. Which of the following is NOT a landform associated with faulting?
(A) Rift Valley
(B) Horst
(C) Batholith
(D) Fault Scarp

232. Consider the following statements about geomorphic hazards:
1. Earthquakes are caused by the sudden release of stress along faults.
2. Volcanoes occur at random locations unrelated to plate tectonics.
3. Landslides can be triggered by both earthquakes and heavy rainfall.
4. Avalanches are rapid flows of rock and mud.
5. Most major geomorphic hazards are expressions of endogenetic forces.

Which of the above statements are correct?
(A) 1 and 3
(B) 1, 3 and 5
(C) 2, 4 and 5
(D) 1, 2, 3, 4, and 5

233. The concept that landforms are a function of 'structure, process, and stage' was the central theme of:
(A) Walther Penck
(B) William Morris Davis
(C) Lester Charles King
(D) Harry Hess

234. Orogenic forces are responsible for:
(A) The formation of continents and oceans.
(B) The formation of mountains.
(C) The vertical uplift or subsidence of landmasses.
(D) The processes of weathering and erosion.

235. The final stage of the Davisian cycle, a low-lying, almost featureless plain, is called a:
(A) Pediplain
(B) Endrumpf
(C) Peneplain
(D) Primarrumpf

236. A rockfall is best described as:
(A) The slow, imperceptible movement of soil downslope.
(B) The rapid sliding of a coherent mass of rock along a defined plane.
(C) The extremely rapid free-fall of individual rocks from a cliff or steep slope.
(D) A flow of a mixture of water, mud, and rock fragments.

237. Which of the following is a direct consequence of the process of denudation?
(A) The formation of a volcanic caldera.
(B) The creation of a mountain range by folding.
(C) The lowering of a landmass and the carving of valleys.
(D) The uplift of a continent due to epeirogeny.

238. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : The collision of the Indian plate with the Eurasian plate is an ongoing process.
Reason (R) : This collision is an example of a convergent plate boundary and is responsible for the continued uplift of the Himalayas and the high seismicity of the region.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

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(C) A is true but R is false.
(D) A is false but R is true.

239. The breakdown of rocks due to changes in temperature, causing them to expand and contract, is a form of:
(A) Chemical weathering
(B) Physical weathering
(C) Biological weathering
(D) Diastrophism

240. The theory that proposes a cyclical progression of landforms through youth, maturity, and old age is attributed to:
(A) Penck
(B) Davis
(C) King
(D) Hess

241. Consider the following statements:
Statement I : Seismicity, folding, faulting, and vulcanicity are all manifestations of endogenetic forces.
Statement II : These processes derive their energy from within the Earth.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

242. In contrast to Davis's model, Penck's model of landscape evolution emphasizes:
(A) The analysis of slope form as a reflection of the rate of uplift versus denudation.
(B) The progression through fixed, time-dependent stages.
(C) The critical role of climate over tectonic activity.
(D) The idea that landscapes evolve primarily through catastrophic events.

243. The Mid-Atlantic Ridge is a classic example of which type of plate boundary?
(A) Divergent
(B) Convergent (oceanic-continental)
(C) Convergent (continental-continental)
(D) Transform

244. A volcanic mudflow is known as a(n):
(A) Avalanche
(B) Pyroclastic flow
(C) Lahar
(D) Ignimbrite

245. Which of the following is NOT an endogenetic force?
(A) Diastrophism
(B) Denudation
(C) Vulcanism
(D) Earthquakes

246. Consider the following statements regarding the Theory of Plate Tectonics:
1. The lithosphere is divided into rigid plates.
2. Plates can be purely oceanic, purely continental, or a combination.
3. The movement of plates is driven by convection in the asthenosphere.
4. Earthquakes and volcanoes are concentrated at plate interiors.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3
(D) 1, 2, 3 and 4

247. A thrust fault is a special type of:
(A) Normal fault with a steep dip.
(B) Reverse fault with a low angle of dip.
(C) Strike-slip fault.
(D) Tensional fracture.

248. The geomorphic cycle proposed by W.M. Davis begins with:
(A) A long period of slow erosion.
(B) Rapid uplift of a landmass to its maximum elevation.
(C) The formation of a peneplain.
(D) The mature stage of maximum relief.

249. Which one of the following provides the power for exogenetic processes?
(A) The Sun
(B) Earth's internal heat
(C) Radioactivity
(D) Tectonic forces

250. Match the items in List I with those in List II.
List I: (Force/Process)
P. Endogenetic Force (Compressional)
Q. Exogenetic Force (Fluvial)

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R. Endogenetic Force (Tensional)
S. Endogenetic Force (Volcanic)

List II: (Resulting Feature)
1. V-shaped Valley
2. Rift Valley
3. Volcanic Cone
4. Fold Mountain

Choose the correct answer from the options given below:
(A) P-1, Q-4, R-2, S-3
(B) P-4, Q-1, R-2, S-3
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-3, R-4, S-1

Direction : Please read the following source carefully.

The theory of Continental Drift, a precursor to modern plate tectonics, posits that Earth's continents have moved over geologic time relative to each other, thus appearing to have "drifted" across the ocean bed. This concept challenged the long-held belief that continents were static and fixed in their positions. The primary proponent of this theory outlined a supercontinent, Pangaea, which existed during the late Paleozoic and early Mesozoic eras. This massive landmass subsequently began to break apart, drifting into the continental configurations we recognize today. Evidence supporting this hypothesis was drawn from several fields: the complementary shapes of coastlines, particularly South America and Africa (jigsaw fit); the distribution of identical fossil species across continents now separated by vast oceans; the correlation of rock types and geologic structures across these oceanic divides; and paleoclimatic indicators suggesting that continents were once in different climatic zones. Despite the compelling evidence, the theory initially faced significant skepticism, primarily because it lacked a convincing mechanism to explain how the continents could move through the rigid oceanic crust. This explanatory gap was a major limitation that would only be resolved with the later development of the theory of plate tectonics, which provided the necessary mechanical framework.

Based on the above source, attempt the following five questions.

251. According to the theory of Continental Drift, what was the name of the supercontinent that existed during the late Paleozoic era?
(A) Rodinia
(B) Pangaea
(C) Gondwanaland
(D) Laurasia

252. Which of the following was NOT cited as a primary piece of evidence for Continental Drift in the paragraph?
(A) The direct measurement of continental movement via satellite geodesy.
(B) The matching geological structures across different continents.
(C) The distribution of similar ancient fossils on separate landmasses.
(D) The apparent fit of coastlines like South America and Africa.

253. What was the main reason for the initial scientific skepticism towards the theory of Continental Drift?
(A) The evidence from paleoclimatology was considered unreliable.
(B) The concept of a single supercontinent was deemed physically impossible.
(C) The absence of a plausible mechanism to explain the movement of continents.
(D) The theory contradicted established religious and philosophical doctrines.

254. Based on the source, one can infer that the theory of Continental Drift was:
(A) a complete and final explanation for crustal dynamics.
(B) a flawed hypothesis that was entirely discarded.
(C) an idea exclusively focused on oceanic crust formation.
(D) an foundational concept that was later expanded upon.

255. The evidence concerning paleoclimatic indicators implies that:
(A) global climate has remained constant throughout geologic time.
(B) all continents experienced a single, uniform ice age.
(C) continents were once situated at different latitudes than they are today.

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(D) climatic zones are independent of a continent's geographic position.

Direction : Please read the following source carefully.

The theory of Plate Tectonics provides a comprehensive model for understanding the large-scale motions of Earth's lithosphere. It builds upon the foundational ideas of continental drift by proposing a mechanism for crustal movement. The lithosphere is not a continuous shell but is broken into a mosaic of rigid plates that move over a more ductile layer in the upper mantle known as the asthenosphere. The primary driving force behind this movement is widely considered to be convection currents within the mantle, where hotter, less dense material rises and cooler, denser material sinks, creating a circulation that drags the overlying plates. Plate interactions occur at their boundaries, which are classified into three main types. Divergent boundaries are where plates move apart, allowing magma to rise and create new crust, as seen at mid-ocean ridges. Convergent boundaries are where plates collide, leading to the subduction of one plate beneath another, forming deep-sea trenches, volcanic arcs, and mountain ranges. Transform boundaries occur where plates slide horizontally past each other, often resulting in significant seismic activity but with little creation or destruction of crust. These interactions are the principal cause of most of the Earth's seismicity, vulcanicity, and major topographic features.

Based on the above source, attempt the following five questions.

256. What is identified in the paragraph as the primary driving force for the movement of lithospheric plates?
(A) The gravitational pull of the moon and sun.
(B) Convection currents within the Earth's mantle.
(C) The rotational force of the Earth's spin.
(D) The pressure exerted by the overlying oceans.

257. Which type of plate boundary is characterized by the creation of new lithospheric crust?
(A) Convergent boundaries
(B) Transform boundaries
(C) Subduction boundaries
(D) Divergent boundaries

258. According to the source, the collision of two plates and the subduction of one beneath the other would most likely result in the formation of:
(A) a deep-sea trench.
(B) a mid-ocean ridge.
(C) a rift valley.
(D) a stable continental platform.

259. A key distinction between transform and convergent boundaries as described in the paragraph is that transform boundaries:
(A) are the primary sites of volcanic activity.
(B) involve the large-scale creation of new crust.
(C) are characterized by plates sliding past one another.
(D) result in the formation of major mountain ranges.

260. Based on the information provided, it can be inferred that regions with high concentrations of earthquakes and volcanoes are most likely located:
(A) along the boundaries where tectonic plates interact.
(B) in the stable interiors of continental plates.
(C) exclusively in the deepest parts of the oceans.
(D) randomly across the Earth's surface.

Direction : Please read the following source carefully.

Geomorphic processes, which are responsible for shaping the Earth's surface, are broadly categorized into two fundamental groups based on their origin: endogenetic and exogenetic forces. Endogenetic forces originate from within the Earth and are driven by its internal heat. These are constructive forces that create relief by uplifting or building up parts of the Earth's surface. They manifest primarily through diastrophism and vulcanicity. Diastrophism involves the slow bending, folding, faulting, and warping of the Earth's crust, leading to the formation of major landforms such as continents, mountain ranges, and plateaus. Vulcanicity, on the other hand, involves the movement of molten rock (magma) onto or toward the Earth's surface, resulting in volcanic eruptions and the creation of features like

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volcanoes and lava plains. In contrast, exogenetic forces originate from sources external to the solid Earth, primarily from the atmosphere and the sun's energy. These are destructive forces that work to wear down the landmasses and reduce relief, a general process known as denudation. Exogenetic processes include weathering, mass wasting, erosion, and deposition, carried out by agents like water, wind, ice, and waves. The Earth's landscape is a dynamic product of the continuous struggle between these two opposing sets of forces.

Based on the above source, attempt the following five questions.

261. Which of the following is described as an endogenetic force?
(A) Erosion by a river
(B) Weathering of rock by frost
(C) Deposition of sand by wind
(D) Folding of the Earth's crust

262. The primary role of exogenetic forces, as presented in the paragraph, is to:
(A) create new continental landmasses.
(B) wear down and reduce the elevation of landforms.
(C) increase the overall relief of the Earth's surface.
(D) drive the movement of tectonic plates.

263. According to the source, diastrophism is a process that leads to the formation of:
(A) lava plains and volcanic cones.
(B) river valleys and deltas.
(C) mountain ranges and plateaus.
(D) glacial moraines and cirques.

264. What is the fundamental distinction between endogenetic and exogenetic forces?
(A) The speed at which they operate.
(B) The geographic location where they occur.
(C) The type of climate required for them to be active.
(D) Their origin, being either internal or external to the Earth.

265. Based on the paragraph, the term 'denudation' can be best understood as the cumulative effect of:
(A) exogenetic processes.
(B) endogenetic processes.
(C) vulcanicity and seismicity.
(D) plate tectonics.

Direction : Please read the following source carefully.

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Denudation encompasses all processes that cause the wearing away of the Earth's surface, leading to a general lowering and leveling of the landscape. It is a comprehensive term that includes the processes of weathering, mass wasting, and erosion. Weathering is a crucial initial stage of denudation, involving the breakdown and decomposition of rock in situ, meaning without significant movement of the resulting material. It is broadly classified into physical (or mechanical) weathering and chemical weathering. Physical weathering involves the disintegration of rocks into smaller fragments without any change in their chemical composition; common processes include frost action, thermal expansion and contraction, and pressure release. Chemical weathering, in contrast, involves the decomposition of rock through chemical reactions that alter the minerals. Processes like oxidation (rusting), carbonation (reaction with carbonic acid), and hydrolysis (reaction with water) change the rock's chemical structure, often making it weaker and more susceptible to erosion. While often categorized separately, biological weathering, where plants and animals contribute to both physical and chemical breakdown, also plays a significant role. Weathering does not transport material itself but prepares it for removal by erosional agents like water, wind, and ice, thereby paving the way for the subsequent stages of denudation.

Based on the above source, attempt the following five questions.

266. What is the defining characteristic of weathering as part of the denudation process?
(A) The large-scale transportation of rock material over long distances.
(B) The breakdown of rock in situ without significant movement.
(C) The deposition of sediments to form new landforms.
(D) The creation of relief through volcanic activity.

267. The process of oxidation, as mentioned in the source, is an example of:
(A) physical weathering.
(B) chemical weathering.
(C) biological weathering.
(D) erosional transport.

268. According to the paragraph, the role of weathering in the larger process of denudation is best described as:
(A) a preparatory stage that breaks down rock for transport.
(B) the final stage involving the deposition of material.
(C) the transportation of rock fragments by wind and water.
(D) the direct cause of large-scale landslides.

269. Which of the following scenarios best illustrates physical weathering?
(A) Limestone dissolving due to acidic rainwater.
(B) Iron-rich minerals in a rock turning reddish-brown.
(C) A rock splitting apart due to water freezing and expanding in its cracks.
(D) The formation of clay minerals from feldspar reacting with water.

270. The paragraph implies that denudation is a multi-stage process. Which sequence correctly represents the initial stages as described?
(A) Erosion followed by weathering.
(B) Deposition followed by weathering.
(C) Transportation followed by decomposition.
(D) Weathering followed by erosion.

Direction : Please read the following source carefully.

The geomorphic cycle, or cycle of erosion, as conceptualized by W. M. Davis, provides a theoretical framework for understanding the evolution of landscapes. Davis's model is famously summarized by his "trio of controllables": structure, process, and stage. 'Structure' refers to the nature and arrangement of the underlying rocks, including their hardness, jointing, and attitude (e.g., folded, faulted, or horizontal). 'Process' encompasses the geomorphic agents (such as running water, glaciers, or wind) that work to erode, transport, and deposit material. 'Stage' is the temporal aspect of the model, describing the degree to which the processes have operated on the structure. The cycle begins with a rapid uplift of a landmass, which Davis considered a brief, initial event. This is followed by a long period of crustal stability, during which the landscape evolves through a sequence of stages: youth, maturity, and old age. The youthful stage is characterized by high relief, steep slopes, and V-shaped valleys as rivers incise vertically. In maturity, valley widening becomes dominant, slopes become gentler, and a well-integrated drainage network develops. Finally, the old age stage is marked by a landscape of very low relief, approaching a nearly flat plain called a 'peneplain', with wide, meandering rivers. The cycle could be 'interrupted' by renewed uplift, initiating a new cycle.

Based on the above source, attempt the following five questions.

271. Which three elements form the "trio of controllables" in Davis's geomorphic cycle?
(A) Uplift, erosion, and deposition
(B) Youth, maturity, and old age
(C) Structure, process, and stage
(D) Water, wind, and ice

272. In the Davisian model, what is the primary characteristic of the youthful stage of landscape evolution?
(A) The formation of a peneplain
(B) Deep, V-shaped valleys and high relief
(C) Dominant valley widening and gentle slopes
(D) A poorly defined drainage system

273. According to Davis's theory, the cycle of erosion is initiated by which event?
(A) A long period of slow, continuous uplift
(B) A sudden cessation of all geomorphic processes
(C) A global change in climate
(D) A rapid, short-lived uplift of a landmass

274. The term 'peneplain' in the context of the geomorphic cycle refers to:
(A) a nearly flat plain of low relief in the final stage of erosion.
(B) a landscape of high mountains and deep valleys.
(C) a coastal plain formed by marine deposition.
(D) the initial upland surface before erosion begins.

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275. What does the concept of 'structure' in Davis's model primarily refer to?
(A) The stage of development of the landscape
(B) The type of erosional agent acting on the land
(C) The characteristics and arrangement of the bedrock
(D) The climatic conditions of the region

Direction : Please read the following source carefully.

Contrasting with the time-dependent model of W. M. Davis, Walther Penck proposed an alternative model of geomorphic analysis that emphasizes the relationship between the rate of uplift and the rate of denudation. Penck's model is not based on sequential stages but on the dynamic interplay of these two competing processes. He argued that landform development is a direct expression of the intensity of endogenetic (uplift) and exogenetic (denudation) forces. Penck identified three main scenarios for slope development. The first is 'aufsteigende Entwicklung' (waxing development), where the rate of uplift exceeds the rate of denudation, resulting in increasing relief and convex slopes. The second scenario, 'gleichförmige Entwicklung' (uniform development), occurs when uplift and denudation rates are in equilibrium, leading to a constant relief and straight, or uniform, slope profiles that retreat parallel to themselves. The third is 'absteigende Entwicklung' (waning development), where the rate of denudation surpasses the rate of uplift (or uplift has ceased), causing a decline in relief and the formation of concave slopes and pediplains. Unlike Davis's peneplain, which is formed at the end of a cycle, Penck's landforms, including the final 'endrumpf' (a type of pediplain), evolve continuously in response to the prevailing tectonic activity.

Based on the above source, attempt the following five questions.

276. What is the central thesis of Penck's model of geomorphic analysis?
(A) The development of landforms is determined by the relationship between uplift and denudation rates.
(B) Landscape evolution proceeds through the fixed stages of youth, maturity, and old age.
(C) Climate is the single most important factor controlling slope form.
(D) All landscapes eventually evolve into a featureless peneplain regardless of tectonic activity.

277. In Penck's terminology, 'aufsteigende Entwicklung' describes a situation where:
(A) denudation and uplift rates are balanced.
(B) denudation rate is greater than the rate of uplift.
(C) tectonic activity has completely stopped.
(D) uplift rate is greater than the rate of denudation.

278. According to Penck's model, what type of slope profile is typically associated with 'gleichförmige Entwicklung' (uniform development)?
(A) Primarily convex slopes with increasing relief.
(B) Straight slope profiles that maintain constant relief.
(C) Primarily concave slopes with decreasing relief.
(D) A complex combination of stepped slopes.

279. A key difference between Penck's and Davis's models is that Penck's model:
(A) assumes a rapid initial uplift followed by a long period of stability.
(B) is a time-dependent model based on sequential stages.
(C) views landscape evolution as a continuous response to tectonic activity.
(D) culminates in the formation of a peneplain through downwearing.

280. The formation of concave slopes and a decline in overall relief are characteristic of which phase in Penck's scheme?
(A) Aufsteigende Entwicklung
(B) Gleichförmige Entwicklung
(C) Primärrumpf development
(D) Absteigende Entwicklung

Direction : Please read the following source carefully.

The development and evolution of slopes are central to geomorphology, and several theories have been proposed to explain the processes involved. Three principal models of slope development are widely recognized: slope decline,

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slope replacement, and parallel retreat. The theory of slope decline, often associated with W. M. Davis, posits that the steepest part of a slope gradually becomes less steep over time. As weathering produces debris at the top of the slope and mass movement transports it downwards, the upper slope becomes progressively gentler, leading to an overall convex-concave profile that flattens with age. In contrast, the theory of slope replacement suggests that the steepest segment of a slope is progressively replaced by a gentler slope from the base upwards. This occurs as scree or debris accumulates at the foot of the slope, burying the lower part of the original steep face and creating a new, less inclined 'debris slope' which then extends upwards. The third model, parallel retreat, championed by L. C. King and linked to Penck's ideas, proposes that the slope angle remains constant as the slope retreats parallel to its original position. This process is common in arid and semi-arid environments and leads to the formation of extensive plains known as pediments at the base of the morphological receding slope.

Based on the above source, attempt the following five questions.

281. Which theory of slope development suggests that the slope angle remains constant as it moves backward?
(A) Parallel retreat
(B) Slope decline
(C) Slope replacement
(D) Slope equalization

282. The accumulation of debris at the base of a slope, which gradually buries the original steep face, is the key mechanism in which model?
(A) Slope decline
(B) Slope replacement
(C) Parallel retreat
(D) Slope rejuvenation

283. According to the paragraph, the model of slope decline is most closely associated with the work of:
(A) L. C. King
(B) W. M. Davis
(C) Walther Penck
(D) G. K. Gilbert

284. The formation of extensive pediments at the base of a receding slope is a characteristic outcome of which process?
(A) Parallel retreat in arid environments
(B) Slope decline leading to a peneplain
(C) Slope replacement in humid climates
(D) Downwearing of the entire slope profile

285. What is the primary difference in the evolution of the upper slope between the slope decline and parallel retreat models?
(A) In slope decline the upper slope becomes steeper, while in parallel retreat it flattens.
(B) Slope decline applies only to coastal cliffs, while parallel retreat applies only to mountains.
(C) In slope decline the upper slope becomes gentler, while in parallel retreat it maintains its angle.
(D) Slope decline involves volcanic activity, while parallel retreat involves glacial action.

Direction : Please read the following source carefully.

Earth movements, driven by endogenetic forces, are responsible for creating large-scale relief features on the planet's surface. These movements are broadly classified as diastrophic and sudden. Diastrophic movements are slow and long-lasting, causing significant deformation of the Earth's crust. They can be further divided into epeirogenic movements, which cause broad-scale uplift or subsidence of continents, and orogenic movements, which are horizontal forces that lead to mountain building. Orogenic movements exert immense compressional or tensional stress on crustal rocks. Compressional forces cause the rock strata to bend and buckle, a process known as folding. This results in the formation of anticlines (up-arches) and synclines (down-folds), which are the fundamental structures of fold mountains like the Himalayas and the Alps. When stresses exceed the rock's elastic limit, or when forces are tensional, the crust may fracture and displace, a process called faulting. Faulting creates features such as fault scarps, rift valleys (grabens), and block mountains (horsts). A graben is a depressed block of land bordered by parallel faults, like the East African Rift Valley, while a horst is an uplifted block situated between faults, such as the Vosges mountains in France.

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Based on the above source, attempt the following five questions.

286. Orogenic movements are described in the paragraph as being primarily responsible for:
(A) the broad uplift of entire continents.
(B) sudden and violent volcanic eruptions.
(C) the general subsidence of coastal regions.
(D) mountain building through horizontal forces.

287. What geological feature is formed when rock strata bend into a down-fold due to compressional forces?
(A) An anticline
(B) A horst
(C) A syncline
(D) A graben

288. According to the source, faulting occurs when:
(A) rock strata bend elastically under slow pressure.
(B) stresses on the crust exceed the rock's elastic limit.
(C) magma intrudes between layers of sedimentary rock.
(D) continents drift apart at a mid-ocean ridge.

289. A rift valley is given as an example of which type of fault-related landform?
(A) A horst, or an uplifted block.
(B) An anticline, or an up-arched fold.
(C) A fault scarp, or an exposed fault plane.
(D) A graben, or a depressed block of land.

290. Based on the text, the primary difference between folding and faulting is that folding is the _____ of rock, whereas faulting is the _____ of rock.
(A) bending; fracturing
(B) melting; solidifying
(C) eroding; depositing
(D) uplifting; subsiding

Direction : Please read the following source carefully.

In addition to slow diastrophic movements, the Earth's surface is also shaped by sudden endogenetic forces, which manifest most dramatically as seismicity and vulcanicity. Seismicity refers to the occurrence or frequency of earthquakes in a region. Earthquakes are the result of a sudden release of energy in the Earth's lithosphere that creates seismic waves. This energy is most commonly released along faults, where tectonic stresses cause the rock masses to slip abruptly past one another. The point within the Earth where the rupture originates is called the hypocenter or focus, and the point on the surface directly above it is the epicenter. The energy released travels in the form of seismic waves, causing the ground shaking that is characteristic of earthquakes. Vulcanicity, or volcanism, involves the eruption of molten rock (magma), along with gases and pyroclastic material, from the Earth's interior onto the surface. Magma that reaches the surface is called lava. This process can be explosive or effusive, depending on the magma's viscosity and gas content. Vulcanicity leads to the formation of various landforms, including volcanoes (such as shield, composite, and cinder cones), lava plateaus, and calderas, which are large depressions formed after a major eruption empties the magma chamber. Both seismicity and vulcanicity are predominantly concentrated along tectonic plate boundaries.

Based on the above source, attempt the following five questions.

291. What is the name for the point on the Earth's surface directly above the origin of an earthquake?
(A) Hypocenter
(B) Focus
(C) Epicenter
(D) Fault line

292. According to the paragraph, vulcanicity is the process that involves:
(A) the eruption of molten rock onto the Earth's surface.
(B) the slow bending and folding of crustal rocks.
(C) the sudden release of energy along a fault.
(D) the wearing away of the landscape by water and wind.

293. The source states that the primary cause of earthquakes is:
(A) the collapse of underground caverns.
(B) the weight of large continental ice sheets.
(C) the impact of large meteorites.
(D) an abrupt slip of rock masses along a fault.

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294. A caldera is described as a landform created by:
(A) the gradual buildup of lava from effusive eruptions.
(B) a large depression formed after a major volcanic eruption.
(C) the accumulation of pyroclastic material in a conical shape.
(D) the fracturing of rock during a seismic event.

295. A major conclusion that can be drawn from the paragraph is that seismicity and vulcanicity are:
(A) randomly distributed across the globe.
(B) phenomena exclusive to continental interiors.
(C) primarily concentrated along tectonic plate boundaries.
(D) more common in polar regions than at the equator.

Direction : Please read the following source carefully.

Geomorphic hazards are natural processes or phenomena occurring in the Earth's crust and on its surface that have the potential to cause loss of life, property damage, and environmental degradation. The occurrence of these hazards is intrinsically linked to geomorphic processes and the landforms they create. Earthquakes, as a geomorphic hazard, are caused by the sudden release of stress along faults, a fundamental process of earth movement. Their hazardous effects include ground shaking, surface rupture, and liquefaction, which can destroy buildings and infrastructure. Volcanoes, while being landform-building agents, pose significant hazards through lava flows, pyroclastic flows (fast-moving currents of hot gas and volcanic matter), and ash falls that can disrupt air travel and agriculture. Landslides, a form of mass movement, are a major hazard in mountainous and hilly terrain. They are often triggered by intense rainfall or seismic activity, which destabilizes slopes. The occurrence is related to landforms with steep gradients and weak geological materials. Avalanches are rapid flows of snow down a sloping surface. Similar to landslides, their occurrence as a hazard depends on specific landform characteristics, namely steep mountain slopes (typically between 30 and 45 degrees), and are triggered by factors like new snowfall, warming temperatures, or human activity. Understanding the link between landforms and these hazards is crucial for mitigation and risk assessment.

Based on the above source, attempt the following five questions.

296. According to the paragraph, which factor is a common trigger for both landslides and earthquakes?
(A) Intense rainfall
(B) Volcanic eruption
(C) Human activity
(D) Seismic activity

297. Pyroclastic flows are identified as a specific hazard associated with which geomorphic phenomenon?
(A) Volcanoes
(B) Earthquakes
(C) Landslides
(D) Avalanches

298. The occurrence of landslides as a hazard is described as being closely related to which landform characteristic?
(A) Low-lying coastal plains
(B) Steep gradients and weak materials
(C) Broad, flat river valleys
(D) Arid desert basins

299. What is the primary cause of an earthquake hazard as stated in the source?
(A) The slow creep of soil down a gentle slope.
(B) The sudden release of stress along geological faults.
(C) The melting of glaciers and rise in sea level.
(D) The eruption of a large shield volcano.

300. Based on the description, a key difference between a landslide and an avalanche is:
(A) landslides involve the movement of rock and soil, while avalanches involve the movement of snow.
(B) landslides occur on gentle slopes, while avalanches occur on steep slopes.
(C) landslides are triggered by rain, while avalanches are triggered by earthquakes.
(D) landslides are a geomorphic hazard, while avalanches are a meteorological hazard.

ANSWERS

1. (B) Alfred Wegener
The theory of Continental Drift, introduced in the early twentieth century, revolutionized how the scientific community understands the Earth's geological history. It posits that the continents were once joined in a single landmass and have since moved across the ocean floor to their current positions. This groundbreaking conceptual framework laid the essential groundwork for the subsequent development of modern plate tectonics and marine geology.

2. (A) Gondwanaland
The southern supercontinent represents a massive segment of the original Pangea landmass that split during the Mesozoic era. It eventually fragmented to form several modern landmasses, including Africa, South America, Antarctica, Australia, and the Indian subcontinent. Geological and fossil evidence across these distant continents confirms their ancient connection, providing crucial support for the early conceptualization of horizontal crustal displacement over vast periods of time.

3. (A) Both Statement I and Statement II are true.
Geomorphic processes are driven by internal and external forces that continuously shape the physical landscape. Internal energy generates relief through tectonic movements, resulting in features like mountains and plateaus. Conversely, external agents like water, wind, and ice act to break down these high-relief structures through denudation. Together, these constructive and destructive forces maintain a dynamic balance that defines the ever-evolving surface of the planet.

4. (D) 1, 2, 3 and 4
Multiple scientific disciplines provide evidence for the historical movement of continents. Observations include the matching shapes of continental margins and the presence of identical fossilized reptiles in widely separated regions. Furthermore, geological records of ancient glaciations in currently tropical zones and the shared distribution of specific organisms like lemurs across different landmasses reinforce the conclusion that these areas were once physically connected.

5. (C) The combined effect of weathering, mass wasting, erosion, and transportation.
Denudation represents the comprehensive set of external processes that wear down the Earth's surface and reduce its overall elevation. This collective action encompasses the initial disintegration of rocks, the downhill movement of debris under gravity, and the active removal and transport of materials by agents such as flowing water or ice. These exogenetic activities work systematically to transform high mountain ranges into low-lying, featureless plains.

6. (B) Erosion
Exogenetic forces originate at or above the planetary surface and are primarily powered by solar energy and gravity. Unlike internal movements such as vulcanicity, seismicity, and diastrophism, these external processes focus on modifying existing relief by wearing it down. Natural agents continuously remove rock and soil from one location and transport it to another. This redistribution of mass serves as a destructive geomorphic force.

7. (A) P-2, Q-1, R-3, S-4
Major milestones in geomorphology and geology were established by key scientists who proposed foundational theories. These include the early hypothesis of moving continents and the systematic description of how landscapes age through time. Later advancements identified the mechanisms of seafloor creation and the intricate relationship between tectonic uplift and surface erosion. Mapping these proponents to their respective concepts highlights the historical development of modern geographical thought.

8. (A) A low-lying plain of faint relief with occasional monadnocks.
At the end of a long period of uninterrupted erosion, a landscape reaches a nearly level surface. This final stage is characterized by very

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gentle slopes and a drainage system that has lost most of its kinetic energy. Resistant rock masses may remain as isolated hills rising above the general level of the plain. These residual features represent the final remnants of the original high relief.

9. (C) Folding
Horizontal compressional forces within the Earth's crust lead to the bending of rock strata. This process creates distinctive wave-like structures consisting of arch-like elevations and trough-like depressions. These features are common in regions that have undergone intense tectonic activity, such as mountain ranges. Unlike fracturing or volcanic activity, this deformation occurs when rocks behave plastically under pressure, resulting in the complex layering seen in nature.

10. (A) Both A and R are true and R is the correct explanation of A.
The intense geological activity around the Pacific Ocean basin is a direct result of the interaction between various lithospheric plates. Most of this region is characterized by zones where oceanic plates are being forced beneath continental or other oceanic plates. This subduction process generates immense heat and pressure, leading to frequent volcanic eruptions and seismic events. This alignment of plate boundaries creates a global ring.

11. (D) Tensional forces causing faulting.
When the Earth's crust is pulled apart by internal forces, it undergoes fracturing and displacement. This tensional stress often results in a central block of land dropping down between parallel faults, creating a steep-sided elongated valley. This geological structure is distinct from valleys carved by water or ice and represents a major tectonic feature. Such formations are significant indicators of active crustal extension and continental breakup.

12. (B) The cycle progresses through fixed stages of youth, maturity, and old age regardless of uplift.
In specific geomorphic models, the evolution of a landscape is viewed as a continuous interaction between the rate of tectonic uplift and the rate of denudation. This approach differs from theories that assume a fixed sequence of time-based stages. Instead, the physical form of the land reflects the current balance of forces. This means that landform development is dynamic and can vary based on changing tectonic intensity.

13. (C) 1, 3, and 5
External geomorphic processes are those that derive their energy from the sun and gravity to act upon the Earth's surface. These activities include the breakdown of rocks in place, the downhill movement of material, and the wearing away of the landscape by natural agents. Unlike internal forces that build relief, these processes focus on the degradation and leveling of landforms through constant physical and chemical interactions.

14. (D) Focus or Hypocenter
The exact location where a seismic rupture begins within the Earth's crust is the primary source of released energy. From this point, seismic waves propagate in all directions, eventually reaching the surface to cause ground shaking. Understanding the depth and position of this origin is critical for analyzing earthquake intensity and mechanics. It serves as the starting point for measuring the distance to recording stations and surface locations.

15. (A) The distribution of earthquakes, volcanoes, and major mountain ranges.
The movement and interaction of large lithospheric plates provide a unified framework for understanding global geological patterns. Most major tectonic events occur at the boundaries where these plates meet, collide, or pull apart. This explains why seismic and volcanic activities are concentrated in specific zones rather than being randomly distributed. It also clarifies the origin of immense mountain systems formed by the compression of the Earth's rigid outer shell.

16. (B) Rift Valley - Endogenetic force
Landforms are categorized based on whether they are created by internal or external forces. Internal forces, such as faulting and folding, are constructive as they build the primary structures of the Earth's crust. For instance, a linear valley formed between parallel faults is a result of internal tensional stress. In contrast, external forces like river erosion or general denudation

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work to wear down and modify these primary features.

17. (A) Both Statement I and Statement II are true.
Early theories of crustal movement faced skepticism because they lacked a plausible driving force. Later scientific discoveries identified that heat-driven circulation within the mantle provides the necessary energy to move rigid lithospheric plates. This advancement replaced the idea of continents drifting through static ocean floors with a more comprehensive model. It established a dynamic system where the Earth's surface is constantly being recycled through internal thermal processes.

18. (A) Slow, long-term deformation of the Earth's crust.
Internal forces often operate over vast geological time scales to reshape the planetary surface through gradual movement. This category of tectonic activity includes the large-scale uplift of mountains and the broad warping of continents. These processes are distinct from sudden events like volcanic eruptions or earthquakes. By causing the slow bending and breaking of rock layers, they create the fundamental structural framework upon which external erosion and weathering act.

19. (C) Carbonation
Chemical weathering occurs when minerals within a rock react with environmental elements to form new substances. One common process involves atmospheric carbon dioxide dissolving in rainwater to create a weak acid. This acidic solution effectively dissolves specific rock types, such as limestone and marble, creating unique underground and surface features. This transformation alters the chemical composition of the material, leading to its eventual disintegration and structural weakening.

20. (A) 3, 2, 1
Landscapes follow a predictable evolutionary sequence as they are modified by erosional processes over time. The initial phase is characterized by rapid vertical incision and steep slopes. As the region develops, relief reaches its maximum and drainage networks become well-integrated. Finally, the terrain is reduced to a low-relief plain with sluggish, meandering rivers. This progression from high energy to low energy defines the lifecycle of regional landform development.

21. (C) Plates sliding past one another horizontally.
Specific zones where lithospheric plates interact without creating or destroying crust are defined by lateral motion. In these areas, large segments of the Earth's outer shell grind past each other along extensive fault systems. This movement frequently results in shallow earthquakes due to the buildup and sudden release of frictional stress. Unlike boundaries where plates collide or diverge, these regions are primarily characterized by horizontal displacement along the contact surface.

22. (B) Lopolith
Magma intruding into the Earth's crust can solidify into various shapes depending on the structural setting of the surrounding rock. One specific type of intrusion is a large, basin-like body that forms when molten material is injected between existing rock layers, causing the floor to sag. This creates a saucer-shaped mass that remains parallel to the bedding of the host rock. These features provide important clues about ancient volcanic activity.

23. (D) Hydrolysis
Physical weathering involves the mechanical breakdown of rocks into smaller fragments without altering their chemical identity. Common mechanisms include the expansion of freezing water, thermal changes, and the removal of overlying pressure. However, some processes specifically involve chemical reactions between water and minerals to produce new compounds. These chemical transformations weaken the rock's internal structure through molecular changes, which is fundamentally different from purely mechanical disintegration caused by physical stresses.

24. (D) 1, 2, 3 and 4
The Earth's rigid outer layer is fragmented into several large and small segments that reside above a more fluid, semi-molten layer. These segments are in constant motion, propelled by the circulation of heat from deep within the planetary interior. The regions where these segments meet are hotspots for geological phenomena, including

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mountain building and seismic activity. This comprehensive system explains the dynamic nature of the Earth's crust over geological time.

25. (C) Walther Penck
Certain geomorphic theories emphasize that the shape of a hillslope is determined by the ongoing relationship between internal uplift and external erosion. According to this perspective, as a landscape evolves, steeper segments are gradually superseded by gentler slopes that migrate upward from the base. This process leads to a transformation of the landscape's profile without requiring a long period of tectonic stability. It highlights the dynamic nature of slope evolution.

26. (B) 1, 3 and 5
Landforms associated with internal heat and molten rock exhibit diverse characteristics. Some are formed by the collapse of volcanic peaks, while others involve the periodic discharge of heated groundwater. Large-scale features can also result from the accumulation of numerous layers of fluid lava over extensive areas. These features differ significantly from structures created by the folding or faulting of rock strata, as they are directly linked to magmatic processes.

27. (D) Earthquake
The sudden movement of rock masses along a fracture in the Earth's crust results in the release of accumulated elastic energy. This energy travels through the ground as vibrations, which can cause significant damage to the surface and structures. This phenomenon is most common along plate boundaries where tectonic stresses are highest. The rapid displacement is the fundamental mechanism behind these seismic events, distinguishing them from gradual movements like soil creep.

28. (B) Structure, Process, and Stage
The appearance and evolution of any landform are determined by three fundamental variables. The first refers to the geological characteristics and arrangement of the rock. The second involves the specific agents of erosion and weathering acting upon the terrain. The third represents the duration for which these agents have been active. Together, these factors explain why different landscapes exhibit varying characteristics even when subjected to similar environmental conditions over time.

29. (C) Continental Drift
Early scientific attempts to explain the movement of continents relied on forces related to the Earth's rotation and gravitational interactions. One proposed mechanism suggested that continents tended to migrate toward the equator, while another focused on the influence of the moon and sun on the Earth's crust. Although these specific forces were later proven insufficient to move massive landmasses, they were central to the original arguments for large-scale horizontal displacement.

30. (C) Statement I is true, but Statement II is false.
Crustal deformation occurs through the breaking and shifting of rock blocks when subjected to extreme stress. A specific type of fracture happens when the crust is stretched, causing one segment to slide downward relative to another. Conversely, compressional forces typically push rock layers together, leading to different structural results. Understanding these mechanics is essential for interpreting the tectonic history of a region and the forces that created its mountain ranges.

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31. (A) Old age stage
In the final phase of landscape evolution, most of the terrain has been worn down to a low-relief erosional plain. However, certain rock masses may be more resistant to weathering and erosion than the surrounding materials. These resistant portions remain as isolated, standing hills that rise above the nearly flat surface. These features serve as indicators that the region has reached an advanced stage of geomorphic development near the base level.

32. (A) P-3, Q-4, R-2, S-1
Different types of fractures in the Earth's crust are classified based on the direction of movement and the nature of the forces involved. Tensional stress creates downward displacement, while compressional stress leads to upward movement of rock blocks. Horizontal shifting occurs along other fault lines. Furthermore, specific tectonic settings can result in the elevation of entire blocks between faults. This variety of crustal responses creates the complex topography observed in active regions.

33. (B) L-waves (surface waves) are the fastest of all seismic waves.
Seismic energy is transmitted through the Earth in different forms, each with unique speeds and properties. The fastest waves are longitudinal and can pass through all states of matter, providing deep interior data. Secondary waves are slower and restricted to solids. The waves that travel along the surface are the slowest of all but cause the most significant structural damage due to their high amplitude and complex motion during a seismic event.

34. (A) Maximum possible relief with a well-integrated drainage network.
During the middle phase of landscape development, the drainage system reaches its most efficient state, and the difference in elevation between the highest and lowest points is at its peak. Valleys have widened significantly, and the original upland surfaces have been largely consumed by expanding drainage basins. This stage represents the transition from the high-energy vertical cutting of youth to the low-energy lateral erosion characteristic of the final stages.

35. (A) Both A and R are true and R is the correct explanation of A.
Environmental conditions significantly influence the rate at which rocks decompose. In regions with high rainfall and warm temperatures, chemical reactions between minerals and water occur much more rapidly. The abundance of moisture facilitates processes like the breaking down of silicate minerals and the dissolution of soluble components. Consequently, landscapes in these climates often exhibit deep soil profiles and rounded landforms resulting from the intense and persistent chemical alteration of the bedrock.

36. (D) Exfoliation
Rocks often experience physical stress due to the significant temperature differences between their outer surfaces and inner cores. In arid environments, the outer layers expand during the heat of the day and contract at night. Over time, this repeated cycle causes the outer skin of the rock to fracture and peel away in thin, curved sheets. This mechanical process gradually rounds the rock mass, creating distinctive dome-shaped features in the landscape.

37. (C) A simple down-fold in rock strata.
When sedimentary rock layers are subjected to lateral compression, they often bend into a series of wave-like structures. The lower, trough-like portion of such a bend is a common feature in folded mountain belts. These formations often correspond to valleys in the early stages of tectonic development. They represent a fundamental type of plastic deformation where the Earth's crust yields to pressure without fracturing, resulting in complex underground and surface patterns.

38. (B) Landslide
Slope stability is heavily compromised when loose material or rock becomes saturated with water. This moisture increases the weight of the mass while simultaneously reducing the friction between particles, making it easier for gravity to pull the material downward. Such events are often triggered by extreme weather or rapid snowmelt. The resulting rapid movement can reshape valley sides and poses a significant risk to human settlements located at the base of steep terrain.

39. (A) 1, 2 and 3
Geomorphologists have proposed various models to explain how hillslopes change over time. Some theories suggest that slopes become progressively flatter as they age. Others argue that steeper segments are replaced by gentler ones from below, or that slopes maintain a constant angle as they retreat back into a highland mass. These differing perspectives highlight the influence of tectonic activity, rock type, and time on the long-term evolution of the Earth's topography.

40. (A) Tethys Sea
During the gradual fragmentation of the Earth's original supercontinent, an ancient oceanic body separated the northern and southern landmasses. This sea played a critical role in global geography for millions of years and served as the site where vast amounts of sediment accumulated. These sediments were later compressed and uplifted during continental collisions to form some of the world's most prominent mountain ranges. It remains a key feature in historical geological reconstructions.

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41. (C) Convergent
Specific boundaries where lithospheric plates move toward each other are characterized by the recycling of the Earth's crust. In these zones, the denser plate typically sinks into the mantle beneath the lighter plate. This process creates deep oceanic depressions and leads to intense volcanic activity and mountain building on the overriding plate. These areas are among the most geologically active regions on the planet, producing the majority of the world's powerful earthquakes.

42. (A) Alluvial fans
Landscapes are shaped by the interplay between internal building forces and external wearing forces. Internal processes create primary features like mountain belts, rift systems, and volcanic structures through tectonic and magmatic activity. Conversely, external agents like flowing water deposit sediment in specific patterns, such as fan-shaped accumulations at the base of mountains. These depositional features are distinct because they result from the transport and settling of material by surface environmental agents.

43. (D) Solution - The dissolving of soluble minerals like rock salt by water.
Chemical weathering involves various reactions that alter the mineral composition of rocks. One fundamental process occurs when water acts as a solvent, directly dissolving specific minerals and carrying them away in a dissolved state. This is particularly effective on rocks containing salts or carbonates. Unlike mechanical breakdown, this process removes material at the molecular level, leading to the formation of unique features like caves and sinkholes in regions with susceptible bedrock.

44. (B) It is a rapid downslope movement of a large mass of snow and ice.
In mountainous regions, the accumulation of heavy snow on steep slopes can become unstable due to various triggers. When the internal strength of the snowpack is exceeded, a massive volume of frozen material slides downward at high speeds. This phenomenon is a major geomorphic hazard that can destroy forests and settlements. It is primarily driven by gravity and the physical properties of snow, rather than volcanic or purely seismic activity.

45. (C) The rate of uplift is greater than the rate of down-cutting, leading to increasing relief.
In certain geomorphic models, the initial development of a landscape is characterized by intense tectonic activity. During this phase, the Earth's crust rises faster than the agents of erosion can wear it down. This results in a significant increase in the elevation difference between valley floors and mountain peaks. The landscape becomes increasingly rugged as vertical relief grows, reflecting the dominance of internal building forces over the external destructive processes of denudation.

46. (D) The symmetrical pattern of magnetic anomalies on either side of mid-oceanic ridges.
Evidence for the continuous creation of new oceanic crust is found in the magnetic record preserved on the seafloor. As magma rises and solidifies at volcanic ridges, minerals align with the Earth's magnetic field. Since this field reverses periodically, it creates a distinctive striped pattern. The fact that these patterns are identical on both sides of the ridge confirms that the seafloor is moving apart, carrying the magnetic record with it like a conveyor.

47. (C) Statement I is true, but Statement II is false.
Volcanic activity encompasses a wide range of processes involving the movement and cooling of molten rock. While some magma reaches the surface to form volcanoes and lava flows, a large portion cools and solidifies deep within the crust. These underground formations are classified as intrusive bodies and can be massive in scale. Understanding the distinction between surface eruptions and subsurface intrusions is vital for interpreting the geological structure and history of many mountainous regions.

48. (B) Horst
Tectonic forces that pull the crust apart can lead to the formation of distinctive stepped landscapes. In some cases, a central block of land remains at a higher elevation while the surrounding blocks drop down along parallel faults. This elevated feature often forms a flat-topped mountain or plateau. These structures are common in regions undergoing continental rifting and provide clear

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evidence of the tensional stresses that have shaped the Earth's rigid outer shell.

49. (B) Hot and arid desert region
Chemical weathering requires specific environmental conditions to proceed effectively, with water being the most critical component. In regions where rainfall is extremely scarce, the chemical reactions that decompose minerals are severely limited. Although temperatures may be high, the lack of moisture prevents processes like carbonation and hydrolysis from occurring at significant rates. Consequently, physical processes like thermal expansion dominate the breakdown of rocks in these dry environments, leading to different landscape characteristics.

50. (A) 1 and 5 only
A classic model of landscape evolution suggests that landforms are the product of geological structure, environmental processes, and the duration of time they have acted. This theory posits that any landscape will undergo a predictable sequence of changes, eventually resulting in a nearly flat, low-relief surface. This final stage represents the ultimate goal of denudation under stable tectonic conditions. These concepts are foundational to understanding how river systems and valleys develop over geological periods.

51. (B) The point on the Earth's surface directly above the focus.
When a seismic event occurs deep within the crust, the energy radiates outward from the source. The location on the planetary surface that is vertically closest to this origin is of great importance for emergency response and scientific study. This point typically experiences the strongest initial shaking and is used to describe the location of the event in news reports and maps. It serves as a critical reference for measuring the geographic impact of an earthquake.

52. (B) Derive their energy from sources external to the solid earth, like the sun.
The Earth's surface is constantly modified by processes that originate from the atmosphere and the surrounding environment. These activities are powered by external energy, which drives the movement of water, wind, and ice. By breaking down rocks and transporting the resulting debris, these forces work to level the landscape. This continuous action contrasts with internal tectonic forces, as the primary goal of these external agents is the reduction of relief through denudation.

53. (C) L. C. King
A significant theory of slope development proposes that as a highland area is eroded, the steep face of the slope moves backward into the mountain mass while maintaining its original angle. This process leads to the expansion of a gently sloping plain at the base of the receding cliff. Unlike models where slopes become flatter over time, this concept emphasizes the lateral migration of the entire slope profile, eventually creating vast, low-relief erosional surfaces.

54. (B) Compressional
When the Earth's crustal plates push against each other, the resulting horizontal pressure causes rock layers to buckle and warp. This process is most effective when rocks are subjected to high temperatures and pressures deep within the crust, allowing them to bend without breaking. This type of deformation is responsible for the creation of the world's most extensive mountain systems. It represents a fundamental constructive mechanism that increases the complexity and elevation of the landscape.

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55. (C) Vulcanicity
The overall leveling of the Earth's surface involves several interrelated external processes. These include the in-situ breakdown of rock, the movement of material under the influence of gravity, and the active removal and transport of sediment by natural agents. Together, these activities constitute denudation. However, internal processes that involve the movement of molten rock from the mantle to the crust are constructive and relief-building, placing them in a separate category from these destructive external forces.

56. (B) Transform boundaries are characterized by extensive volcanic activity.
Lithospheric plates interact in several ways, each producing distinct geological features. At zones where plates pull apart, new seafloor is created through volcanic eruptions. Areas where plates collide often result in massive mountain belts and deep trenches. In contrast, boundaries

where plates simply slide past each other are dominated by horizontal movement and frequent earthquakes. Unlike other types of boundaries, these zones typically lack the conditions necessary for large-scale magma generation and significant volcanic eruptions.

57. (B) P-4, Q-3, R-1, S-2
Various natural agents drive specific geomorphic processes that reshape the Earth's surface. Gravity is the primary force behind the downhill movement of rock and soil. In cold climates, the freezing of water in fractures mechanically breaks rocks apart. Chemical changes also occur as atmospheric gases react with minerals, leading to the formation of oxides or the dissolution of carbonates. Each of these interactions contributes to the constant modification and eventual leveling of the landscape.

58. (C) Davis assumed uplift is a rapid event preceding a long period of stability, while Penck integrated uplift and denudation throughout the cycle.
The two most famous models of landscape evolution differ fundamentally in their assumptions about tectonic activity. One model suggests that a landmass is uplifted quickly and then remains stable while erosion wears it down. The other proposes that uplift and erosion occur simultaneously, with the final landform reflecting the ongoing balance between these two forces. This distinction is critical because it changes how geomorphologists interpret the relationship between the Earth's internal energy and its surface features.

59. (C) A much more rapid and often catastrophic movement.
Mass wasting events vary greatly in their speed and impact. Some movements occur so slowly that they are only detectable over many years through the tilting of trees or fences. In contrast, other events involve the sudden and violent displacement of large volumes of rock and soil down a slope. These fast-moving events are often triggered by heavy rain or seismic activity and can cause immediate and widespread destruction to the environment and infrastructure.

60. (A) Both A and R are true and R is the correct explanation of A.
The Earth's highest mountain range is a direct product of the collision between two major lithospheric plates. As these massive landmasses converged, the intervening seafloor was compressed and uplifted, creating folded rock structures. This tectonic process continues today, resulting in ongoing elevation gain and frequent seismic activity in the region. These mountains are considered young because they formed relatively recently in geological history and still possess high, rugged peaks and active growth.

61. (C) Pangea
Millions of years ago, all of the Earth's major landmasses were clustered together into a single, enormous continent. This massive structure was surrounded by a global ocean and represented a unique phase in planetary geography. Eventually, internal tectonic forces caused this supercontinent to fracture and drift apart, leading to the formation of the continents and oceans we recognize today. This ancient unity explains the remarkable similarities in fossils and rock types found across different modern continents.

62. (A) V-shaped valleys
In the early stage of a geomorphic cycle, rivers possess high kinetic energy and primarily erode their channels downward. This intense vertical incision creates steep-sided valleys with narrow floors. During this phase, the drainage system is not yet fully developed, and the landscape is dominated by high divides and numerous waterfalls. These features are characteristic of a landscape that has been recently uplifted and is being aggressively modified by the initial forces of running water.

63. (B) 3 and 4 only
Internal forces are classified by the speed at which they modify the Earth's crust. Slow movements occur over millions of years, resulting in the gradual bending of rocks or the regional uplift of landmasses. However, other events happen almost instantaneously in geological terms. These rapid occurrences include the sudden release of seismic energy and the extrusion of molten rock onto the surface. These events can dramatically reshape the local landscape in a matter of seconds or days.

64. (B) Harry Hess

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A critical breakthrough in geological science proposed that new oceanic crust is continuously formed at volcanic ridges in the middle of the oceans. This molten material pushes older crust away, causing the ocean basins to expand over time. This concept provided the missing link for earlier ideas about moving continents by identifying a viable mechanism for crustal growth and movement. It remains a cornerstone of the modern understanding of how the Earth's surface is recycled.

65. (C) Iron
Chemical weathering is highly effective on minerals that react easily with atmospheric oxygen. When rocks containing metallic elements are exposed to air and water, they undergo a transformation similar to the rusting of metal. This process changes the mineral's chemical state, often resulting in a reddish or yellowish coloration on the rock surface. This alteration weakens the internal structure of the rock, making it more susceptible to further disintegration and eventual erosion by natural agents.

66. (B) The period of time required for a landscape to pass through the stages of youth, maturity, and old age.
A foundational concept in geomorphology describes the systematic transformation of a landscape over vast periods of time. It assumes that a newly uplifted landmass will progress through a series of predictable stages as it is acted upon by erosion. Each stage is characterized by distinct landforms and drainage patterns. This cycle continues until the entire region is reduced to a nearly level plain, representing the completion of a long-term evolutionary process under stable conditions.

67. (D) Statement I is false, but Statement II is true.
Natural disasters that reshape the Earth's surface can be triggered by a variety of internal and external factors. While earthquakes and volcanic eruptions originate from within the planet, other hazards like slope failures are more complex. These events can be caused by seismic shaking but are frequently initiated by external environmental factors such as intense rainfall or rapid snowmelt. Recognizing the diverse origins of these hazards is essential for accurate risk assessment and environmental management.

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68. (B) Up-arched, with older rocks in the center.
When layers of sedimentary rock are compressed, they buckle into distinctive wave-like patterns. One common form is a convex-upward fold where the rock layers are arched toward the sky. In this structure, the deepest and oldest layers are located at the core of the fold. These features are frequently found in mountain belts and are important for identifying areas of intense crustal shortening. They represent a fundamental response of the Earth's crust to horizontal pressure.

69. (C) Divergent boundary
Specific zones where tectonic plates move away from each other are essential for the continuous renewal of the Earth's outer shell. In these regions, the crust is stretched and thinned, allowing magma from the mantle to rise and solidify. This process adds new material to the edges of the plates, primarily along ocean ridges. These boundaries are constructive because they actively build new lithosphere, which eventually pushes older crust toward distant subduction zones for recycling.

70. (B) 2, 3, 1
The modern understanding of the Earth's dynamic crust evolved through several distinct phases of scientific thought. It began with the early hypothesis that continents were once united and moved across the globe. Later, researchers identified that the seafloor itself is spreading and creating new crust. Finally, these ideas were integrated into a comprehensive theory that describes the movement of large lithospheric plates. This logical progression reflects the accumulation of geological evidence over several decades.

71. (B) Peneplain
Different geomorphic models use unique terminology to describe the final product of landscape evolution. In one major theory, the cycle ends with a low-relief erosional plain that is nearly featureless except for occasional resistant hills. Another model describes a similar end state reached through the continuous interaction of uplift and denudation. Despite the different

names used by various researchers, both terms refer to the ultimate stage where the land surface has been reduced to its base level.

72. (B) Mass Wasting
The collective downward movement of surface materials under the primary influence of gravity is a major geomorphic process. This category includes a wide range of events, from the slow, imperceptible movement of soil to the sudden and catastrophic collapse of mountain sides. These processes do not require a specific transporting agent like wind or water, although moisture often acts as a lubricant. They play a critical role in widening valleys and reducing the steepness of slopes.

73. (C) Subduction zones
Earthquakes that originate at great depths within the Earth are typically associated with specific tectonic settings. These events occur when an oceanic plate is forced deep into the mantle beneath another plate. As the sinking slab descends into the hotter interior, it remains rigid enough to fracture and release seismic energy. These deep-focus events provide valuable information about the behavior of the lithosphere as it is recycled back into the planetary interior at convergent boundaries.

74. (D) 1, 2, 3 and 4
Comparing foundational geomorphic theories reveals shared conclusions and significant differences in perspective. Some models emphasize time-based stages and specific climate zones, while others focus on the balance between tectonic uplift and erosion. Despite these differences, most theories agree that landscapes eventually evolve toward a state of low relief. Understanding these various approaches provides a comprehensive view of how scientists have historically conceptualized the long-term development and decay of the Earth's diverse surface features.

75. (B) Magma is molten rock below the surface, while lava is molten rock on the surface.
Molten rock is the fundamental material for all volcanic activity, but its name changes based on its location. When it exists deep within the Earth's crust or mantle, it is subjected to immense pressure and contains dissolved gases. Once this material erupts onto the surface through a volcano or fissure, it loses many of its gases and begins to cool rapidly. This distinction is important for geologists because it determines the types of rocks and landforms.

76. (D) Carbonation
Weathering is divided into physical and chemical categories based on the mechanism of rock breakdown. Physical processes involve mechanical stresses like the growth of salt crystals, the expansion of freezing water, and pressure changes. These actions break rocks into smaller pieces without changing their mineral identity. However, some processes specifically involve chemical reactions between minerals and environmental elements like carbon dioxide. These reactions alter the chemical structure of the rock, which places them in a different category.

77. (C) Isostasy
The Earth's rigid crust remains in a state of balance as it resides on the more plastic layer beneath it. This principle suggests that the height of the crust is determined by its density and thickness, much like an iceberg in the ocean. When weight is added through glaciation or removed through erosion, the crust adjusts vertically to maintain equilibrium. This ongoing adjustment is essential for understanding long-term changes in elevation and the stability of continental landmasses.

78. (C) Avalanches in high mountain regions
Many powerful geomorphic hazards are directly linked to the movement of lithospheric plates. Seismic events and volcanic eruptions are primary examples, as they occur frequently at plate boundaries. Even large-scale ocean waves are often generated by tectonic movements on the seafloor. However, certain events are more closely tied to atmospheric conditions and gravity. The rapid movement of snow down a mountain is driven by local weather patterns and slope steepness rather than internal tectonic forces.

79. (A) Both Statement I and Statement II are false.
Geomorphic forces and crustal movements are governed by specific mechanical principles. Internal forces can be either tensional, pulling the crust apart, or compressional, pushing it together. These stresses lead to different structural results,

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such as the buckling of rock layers or the creation of fractures and displacements. External forces focus on the redistribution of mass rather than these structural deformations. Misunderstanding these basic mechanical relationships can lead to incorrect interpretations of how various geological features.

80. (B) Compressional stress
When segments of the Earth's crust are pushed together by horizontal forces, the rock layers may eventually fracture if the pressure is high enough. In this situation, one block of rock is forced upward over the adjacent block along a diagonal plane. This type of displacement is characteristic of regions undergoing intense shortening, such as active mountain belts. It represents a fundamental way the crust accommodates pressure, leading to the thickening and elevation of continental masses.

81. (D) Broad, sluggishly meandering rivers and ox-bow lakes on a low-relief plain.
In the final stage of landscape evolution, the terrain has been worn down to a nearly level surface. Rivers in this environment have very little gradient, causing them to flow slowly and develop wide, looping curves. Over time, these loops may be cut off, leaving crescent-shaped lakes. The absence of steep slopes and high relief indicates that the erosional power of the drainage system has reached its minimum as it approaches the base level.

82. (A) 1, 2, 3, and 5
Tectonic processes are directly responsible for creating specific landforms at plate boundaries. When plates collide, they can form deep oceanic trenches or massive mountain ranges. Zones where plates pull apart are marked by long volcanic ridges on the seafloor. Additionally, plumes of heat from the deep mantle can create chains of volcanic islands as plates move over them. Each of these features serves as a clear indicator of the specific tectonic forces at work.

83. (C) Propose a credible mechanism for the movement of continents through the sea floor.
Although early proponents of moving continents provided significant geological and biological evidence, their theories were initially rejected by the scientific community. The primary obstacle was the lack of a physical explanation for how solid continental masses could plow through the rigid ocean floor. Without a plausible source of energy or a clear understanding of the Earth's interior, the idea seemed physically impossible. It took several decades for researchers to identify the role of mantle convection.

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84. (B) Orogeny
The continuous modification of the Earth's surface involves processes that either build relief or wear it down. Destruction of high-relief features occurs through the in-situ breakdown of rock, the downhill movement of material, and the active removal of debris by natural agents. These are all part of a larger destructive system. In contrast, the internal processes that lead to the large-scale folding and uplift of mountain ranges are constructive and relief-building, placing them in a different category.

85. (C) The set of processes involving the movement and solidification of magma.
Internal heat drives the movement of molten rock from the mantle into the Earth's crust and eventually onto the surface. This activity includes the formation of large underground bodies of rock as well as the eruption of volcanoes and lava flows. These processes are fundamental to the creation of new crust and the building of diverse landforms. They represent a major constructive force that constantly adds new material to the planetary surface and reshapes its physical structure.

86. (A) Both A and R are true and R is the correct explanation of A.
Prominent geomorphic theories offer different perspectives on how landscapes change over time. The primary divergence among these models lies in their basic assumptions about tectonic activity and its relationship with erosion. Some emphasize fixed chronological stages, while others focus on the dynamic balance between internal and external forces. These different assumptions lead to unique conceptualizations of slope behavior, explaining why researchers arrived at different conclusions regarding the ultimate shape and evolution of the Earth's surface.

87. (B) A down-dropped block of land between two normal faults.

Tensional forces in the Earth's crust can cause it to pull apart and fracture along parallel lines. In this setting, the central segment of land may sink relative to the surrounding blocks, creating a distinct linear depression. This structural valley is often bordered by steep, fault-bounded walls and can extend for hundreds of kilometers. These features are significant indicators of active crustal extension and are foundational to the formation of rift systems and new ocean basins.

88. (B) Provided a unified explanation for diverse geological phenomena like earthquakes, volcanoes, and mountain building.
The development of a comprehensive theory describing the movement of large crustal plates revolutionized Earth science. By identifying how these plates interact at their boundaries, scientists could finally explain why geological events are concentrated in specific zones. This framework linked previously separate observations about the distribution of seismic activity, the origin of volcanic arcs, and the formation of massive mountain systems. It provided a single, coherent mechanism that describes the dynamic behavior of the planet's outer shell.

89. (C) An earthquake triggering a massive landslide.
Geomorphic hazards often involve a chain of events where an internal force initiates a surface process. For instance, the sudden release of seismic energy can cause the ground to shake violently, destabilizing steep slopes. This shaking can then lead to the rapid downward movement of rock and soil, which is an external erosional process. Such events demonstrate the complex interaction between the Earth's internal tectonic activity and the gravitational forces that shape the landscape's surface.

90. (A) P-3, Q-1, R-2, S-4
A classic model of landscape evolution describes the systematic changes in topography and drainage over time. The initial phase is marked by deep, narrow valleys and high-energy river systems. As the landscape matures, relief reaches its peak and the drainage network becomes more complex. Finally, the terrain is reduced to a nearly flat plain where only a few resistant hills remain. These sequential stages reflect the long-term impact of erosion on a stable landmass.

91. (D) Laccolith
Magmatic activity produces a variety of landforms both on the surface and within the crust. While some features like lava plateaus and volcanic cones result from eruptions, a large amount of molten rock solidifies before reaching the air. These underground structures can take many forms, such as large mushroom-shaped bodies that dome up the overlying rock layers. These features are only revealed after millions of years of erosion have removed the original surface material above them.

92. (C) W. M. Davis
A foundational concept in geography suggests that any landform can be understood by analyzing three primary factors. These include the geological arrangement and nature of the rock, the specific agents of erosion at work, and the total time these processes have been active. This framework implies that landscapes pass through a predictable life cycle as they are worn down. It has been a central theme in geomorphology for describing the orderly development of the Earth's surface features.

93. (B) Origin
The forces that shape the Earth's surface are fundamentally classified based on where they occur. Internal forces arise from deep within the planetary interior and are driven by heat and pressure. These activities focus on building the structural framework of the crust. In contrast, external forces originate from the atmosphere and are powered by solar energy. Their primary role is to modify and wear down the relief created by internal forces through weathering and erosion.

94. (C) King's theory of pediplanation involves the parallel retreat of scarps.
Different models explain the retreat of high-relief areas into mountain masses. One prominent theory suggests that as the steep face of a highland is eroded, it moves backward while maintaining a consistent angle. This process leaves behind a broad, gently sloping erosional surface at the foot of the cliff. This lateral migration of slopes is a key mechanism for the development of vast plains in arid and semi-arid regions, differing from models that emphasize slope flattening.

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95. (B) The oceanic plate subducts beneath the continental plate.
When a dense oceanic plate meets a lighter continental plate, the heavier slab is forced into the mantle. This collision results in the formation of a deep oceanic trench at the point of contact. As the sinking plate reaches higher temperatures, it melts and generates magma that rises to form volcanic mountain ranges on the continent. This process is a major driver of crustal recycling and is responsible for many of the world's most active geological regions.

96. (B) 1, 2 and 3
Weathering encompasses the diverse processes that break down rocks at or near the Earth's surface. These include mechanical disintegration without chemical changes and the decomposition of minerals through chemical reactions. Furthermore, living organisms can contribute to both physical and chemical breakdown. Unlike erosion, which involve the transport of material, weathering is characterized by the in-situ modification of rock. Understanding these different mechanisms is essential for studying soil formation and the long-term degradation of the landscape.

97. (C) The angle of the slope and the stability of the snowpack.
In high-altitude environments, the accumulation of snow on steep terrain creates a potential hazard. The stability of this mass depends on the physical properties of the snow layers and the steepness of the ground beneath it. If the gravitational force exceeds the internal strength of the snowpack, a rapid downward movement occurs. While external triggers like weather or noise can initiate the event, the underlying causes are found in the relationship between gravity and snow structure.

98. (C) Statement I is true, but Statement II is false.
Slow tectonic processes are responsible for the large-scale deformation of the Earth's crust over millions of years. These activities create foundational relief features like mountain belts and broad continental uplifts. In contrast, sudden events like earthquakes and volcanic eruptions occur over very short time frames. While all these processes originate from internal forces, they are categorized differently based on their duration and the nature of the movement. This distinction is important for understanding geological time and hazards.

99. (C) Seismicity
The scientific study of ground vibrations and the energy released by fracturing rock within the Earth provides critical insights into the planet's dynamic interior. This field focuses on identifying the causes, frequency, and distribution of these events across the globe. By analyzing the waves generated by these occurrences, researchers can determine the location of plate boundaries and the structure of the Earth's layers. This knowledge is fundamental for hazard mitigation and understanding global tectonic patterns.

100. (C) The rate of uplift is balanced by the rate of erosion, leading to constant slope forms.
In specific geomorphic models, a landscape can reach a state where internal building forces and external wearing forces are in equilibrium. During this phase, the Earth's crust is being uplifted at the same speed that the agents of denudation are removing material. This balance results in the maintenance of constant slope angles and relief over time. It represents a dynamic stability where the physical appearance of the terrain remains consistent despite the continuous movement of material.

101. (D) Syncline
Fractures and displacements in the Earth's crust lead to the formation of diverse landforms. These include linear valleys created by sinking blocks, elevated flat-topped mountains, and steep cliffs along fault lines. However, wave-like bends in rock layers are the result of plastic deformation under compressional stress rather than fracturing. These folded structures represent a different type of tectonic response, where the crust buckles rather than breaks, resulting in distinctive trough-like or arch-like features in the landscape.

102. (C) Plate Tectonics
The presence of a massive volcanic ridge system in the middle of an ocean basin is best explained by the movement of crustal plates. In this setting, the plates are pulling apart, allowing magma to rise and create new seafloor. This continuous process pushes the older crust outward, causing the ocean to widen. This comprehensive theory

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provides the most complete explanation for the distribution of seafloor ages and the magnetic patterns observed across the ocean floor.

103. (B) Weathering, Mass Wasting, Erosion
The overall reduction of continental elevation is achieved through the combined action of several surface processes. This system begins with the disintegration of rock in its original location. Subsequently, gravity pulls the loosened material down slopes, and natural agents like water and wind actively remove and transport the debris. Together, these destructive activities work to level the landscape. This continuous cycle of degradation is essential for shaping the topography of the Earth over geological time.

104. (D) 1, 2, 3, 4, and 5
Regions where tectonic plates move toward each other exhibit intense geological activity and diverse physical features. These include deep oceanic depressions, volcanic chains, and massive mountain belts formed by the buckling of the crust. Frequent seismic events are also characteristic of these zones as plates grind against and beneath each other. These various phenomena are all logical consequences of the immense pressure and heat generated at convergent boundaries, making them some of the most dynamic areas on Earth.

105. (C) Frost Action or Frost Wedging
In regions with fluctuating temperatures, the physical breakdown of rocks is often driven by the behavior of water in fractures. When water enters a crack and freezes, it expands significantly, exerting immense outward pressure on the surrounding rock walls. Repeated cycles of freezing and thawing gradually widen the fracture until the rock splits apart. This mechanical process is a major factor in the erosion of high-altitude and high-latitude landscapes, where temperature cycles are common.

106. (B) The theoretical lowest limit to which a landscape can be eroded, often sea level.
Erosion is limited by a fundamental boundary that determines the maximum depth to which natural agents can wear down the land. This limit is typically the elevation of the ocean, as rivers lose their power to erode once they reach the sea. All geomorphic cycles move toward this ultimate level. Understanding this concept is essential for analyzing how landscapes respond to changes in sea level or tectonic uplift, as it governs the potential energy of drainage systems.

107. (B) It results from tensional forces, causing the hanging wall to move down.
When the Earth's crust is stretched by internal forces, it often fractures and displaces rock blocks. One specific type of fracture occurs when tensional stress causes one segment of rock to slide downward relative to the adjacent block. This movement creates a distinctive vertical displacement and is common in regions undergoing crustal extension, such as rift valleys. This process is a fundamental mechanism of tectonic deformation, reflecting the pulling apart of the Earth's rigid outer shell.

108. (A) Both A and R are true and R is the correct explanation of A.
Slope instability is determined by the relationship between the downward pull of gravity and the internal strength of surface materials. Steeper gradients naturally experience a greater force pulling material toward the base. Furthermore, if the material consists of loose or poorly consolidated debris, it lacks the necessary cohesion to resist this movement. Consequently, these areas are highly prone to sudden failures, especially when external factors like rainfall further weaken the material's resistance to gravitational stress.

109. (B) Formation of a river delta
Surface processes driven by solar energy and gravity continuously modify the Earth's topography. One such activity involves the deposition of sediment by flowing water as it enters a standing body of water. This accumulation of material creates a distinctive landform that expands outward over time. Unlike internal tectonic movements that build relief, these external processes focus on the transport and settling of debris, illustrating the constructive role of exogenetic agents in shaping coastal and river environments.

110. (B) Wegener believed continents moved, while plate tectonics theory holds that entire lithospheric plates move.
Modern geology identifies a more complex system of movement than originally proposed

in early theories. Rather than continents simply drifting through a static ocean floor, the entire rigid outer layer of the Earth is fragmented into large segments. These segments, which include both continents and ocean basins, move as unified units over a more fluid interior. This distinction is critical because it identifies the true scale of the moving masses and explains how the entire seafloor is constantly being recycled.

111. (A) Both Statement I and Statement II are true.
In specific geomorphic models, the physical profile of a hillslope is a direct indicator of the tectonic history of the region. If the rate of internal uplift is increasing, the landscape responds by developing a convex-upward profile. Conversely, the overall form of the slope reflects the ongoing competition between internal building forces and external wearing forces. This approach allows geomorphologists to infer past and current tectonic intensity simply by analyzing the geometry of the Earth's surface.

112. (C) L-waves (Surface waves)
Seismic energy travels in different forms, with some waves moving through the Earth's interior and others moving along its outer skin. The waves that travel on the surface are particularly significant during a seismic event. Although they move slower than interior waves, their complex motion and high amplitude cause the most severe ground shaking. These waves are responsible for the vast majority of structural damage observed during earthquakes, making them a primary concern for hazard mitigation.

113. (A) P-2, Q-1, R-4, S-3
Major natural hazards are driven by specific physical mechanisms that originate from internal or external sources. Seismic events result from the sudden release of accumulated energy in the crust, while volcanic activity involves the movement of molten rock. Other hazards are triggered by gravity and environmental conditions, such as the failure of steep slopes or the rapid movement of snow. Understanding these primary causes is essential for predicting and managing the impact of these dynamic geological.

114. (B) Erosion
The planetary surface is constantly modified by natural agents that detach and transport rock and soil. This process differs from the simple in-situ breakdown of material, as it involves the active relocation of debris by moving water, wind, or ice. Over time, this constant removal of material carves deep valleys and reduces the overall height of mountains. It is a fundamental part of the destructive system that levels the Earth's surface and redistributes mass across the globe.

115. (C) Was considered mathematically insufficient to move massive continental masses.
Early scientific arguments for horizontal crustal movement relied on forces related to the Earth's rotation and gravitational pulls. One proposed force suggested that continents were pushed away from the poles toward the equator. However, subsequent physical analysis proved that these interactions were far too weak to overcome the friction of the Earth's rigid outer shell. The failure to identify a strong enough driving force led to the initial rejection of these theories until mantle convection was later discovered.

116. (C) A caldera
Intense volcanic activity can result in the formation of massive depressions in the landscape. When a large volume of magma is erupted from a shallow chamber, the overlying rock loses its support and collapses into the void below. This creates a wide, basin-like feature that is much larger than a typical volcanic crater. These structures are significant indicators of powerful explosive eruptions and provide important clues about the historical intensity of magmatic processes in a region.

117. (C) Absteigende entwicklung
In certain models of landscape evolution, a final phase occurs when the rate of internal uplift begins to decrease. During this period, the agents of denudation become more effective than the tectonic building forces, leading to a steady reduction in overall relief. The landscape becomes progressively flatter as the difference in elevation between valley floors and mountain peaks shrinks. This transition marks the decline of the landmass toward its final, low-relief erosional state near base level.

118. (C) Weathering is the breakdown of rock, while erosion is the transport of the resulting debris.

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The modification of the Earth's surface involves two distinct but related stages of landform degradation. The first stage focuses on the physical disintegration and chemical decomposition of rocks in their original location. The second stage involves the active removal and movement of this loosened material by natural agents like water and wind. Together, these processes work systematically to wear down the landscape. Understanding the difference between in-situ breakdown and active transport is fundamental to the study of geomorphology.

119. (A) 1 and 2
The Earth's topography is shaped by the ongoing competition between forces that build relief and those that wear it down. Internal forces, driven by heat and pressure, create primary features like mountain belts and plateaus. In contrast, external processes, powered by solar energy, act to degrade these high-relief structures through weathering and erosion. This dynamic interaction ensures that the planetary surface is constantly being modified, with internal building and external degradation maintaining a complex geological balance.

120. (B) 3, 2, 1
Magmatic intrusions take many forms and vary significantly in scale. Some features are relatively small, sheet-like bodies that cut across existing rock layers. Others are larger, mushroom-shaped masses that dome up the surface. The largest type of intrusion consists of massive, deep-seated bodies of rock that can cover thousands of square kilometers once exposed by erosion. Ordering these features by size reveals the diverse scale of magmatic activity occurring within the Earth's crust throughout geological history.

121. (C) Transform
A famous fault system in North America represents a boundary where two large lithospheric plates grind past each other horizontally. This region is dominated by lateral movement rather than the creation or destruction of crust. Because the plates move at different speeds and in slightly different directions, immense stress builds up along the contact surface, leading to frequent and sometimes powerful seismic events. This area is a classic example of horizontal displacement along an extensive crustal fracture.

122. (D) Carbonation-Solution
Specific types of rock are highly susceptible to the chemical action of acidic groundwater. When rainwater absorbs carbon dioxide, it forms a weak acid that can dissolve minerals in rocks like limestone. Over vast periods, this process carves out underground networks, deep sinkholes, and complex surface topography. This transformation represents a unique type of landscape development where the removal of material occurs through chemical dissolution rather than mechanical abrasion, leading to highly specialized landforms and drainage.

123. (C) Vigorous vertical erosion by rivers
In the initial stage of regional development, a newly uplifted landmass is subjected to intense degradation. Rivers in this phase possess high gravitational potential energy, allowing them to cut deeply into the bedrock. This leads to the formation of steep-sided, narrow valleys and high relief between mountain peaks and valley floors. The landscape is characterized by rugged terrain and an immature drainage system that has not yet reached its most efficient state, reflecting the dominance of vertical incision.

124. (D) 1, 2, 3, 4 and 5
The stability of a slope is influenced by a complex combination of physical, environmental, and geological factors. The steepness of the terrain and the nature of the material provide the basic framework for instability. External factors like the amount of moisture and the presence of root systems further modify the resistance to movement. Finally, sudden events like ground shaking can provide the necessary trigger for failure. Recognizing these various influences is essential for accurate hazard assessment.

125. (C) Palaeomagnetic data from the ocean floor
Early evidence for moving continents was based on several distinct observations from different scientific fields. These included the matching shapes of continental margins, the distribution of identical fossils across vast oceans, and similar geological structures on distant landmasses. However, some types of evidence, such as the record of magnetic field reversals preserved in oceanic rock, were only discovered decades later with the advancement of marine exploration.

These subsequent findings provided the final scientific proof for earlier continental theories.

126. (D) Batholith
Massive intrusive igneous bodies represent the cooling and solidification of enormous volumes of magma deep within the Earth's crust. These structures are often irregular in shape and can extend over vast areas, forming the core of many large mountain ranges. Because they are deep-seated, they are only revealed at the surface after millions of years of denudation have removed the overlying rock. These features are among the largest volcanic landforms and are fundamental to crustal structure.

127. (A) Both A and R are true and R is the correct explanation of A.
Scientific understanding of the Earth's dynamic surface has evolved from early hypotheses to a more comprehensive framework. While initial theories identified the horizontal movement of landmasses, they lacked a clear explanation of the mechanisms involved. Later research integrated these early ideas with new discoveries about seafloor creation and mantle behavior. This combined model explains not only why continents move but also how the entire crust is created and recycled, representing a major advancement in global geological science.

128. (D) Vulcanicity
Internal forces are classified according to the speed at which they transform the landscape. Some processes operate very slowly over millions of years, leading to the gradual bending of rock layers or the regional uplift of continents. In contrast, certain events occur with great speed, potentially reshaping local topography in a matter of hours or days. These rapid occurrences involving the movement of molten rock are powerful constructive events that create new landforms almost instantaneously in geological terms.

129. (C) L. C. King
A significant theory of landscape evolution proposes that high-relief areas move backward into a mountain mass while maintaining their steepness. This process of lateral retreat leaves behind a broad, gently sloping plain at the base of the receding highland. This model is particularly useful for explaining the development of vast erosional surfaces in arid and semi-arid regions. It emphasizes the importance of scarp retreat and the expansion of pediments over the gradual flattening of the entire landscape.

130. (C) Statement I is true, but Statement II is false.
Crustal deformation involves different mechanical responses to tectonic stress. Rocks can either bend into wave-like patterns or break and shift along fractures. These features are primary indicators of the Earth's internal energy and provide a structural framework for the landscape. While they are subsequently modified by external agents like wind and water, their origin is purely internal. Understanding the difference between bending and breaking is essential for interpreting the tectonic history and forces of a given region.

131. (D) Mantle plume or 'hotspot'
Most volcanic activity is concentrated at plate boundaries, but some significant features form far from these active zones. These occurrences are linked to stationary plumes of heat that rise from deep within the mantle. As a lithospheric plate moves over such a plume, it creates a sequence of volcanoes. Over time, this results in a linear chain of islands or seamounts of increasing age. This process demonstrates that magmatic activity can occur independently of the surrounding plate boundary.

132. (A) P-3, Q-1, R-2, S-4
Several models have been proposed to describe how hillslopes and landscapes evolve over vast periods of time. These theories differ on whether slopes become flatter, maintain a constant angle while retreating, or are replaced by gentler segments from below. Some models focus on humid environments, while others are better suited for arid regions. Mapping these diverse concepts to their respective proponents highlights the historical development of geomorphic thought and the search for a unified theory of landform evolution.

133. (B) Separated the continents of Laurasia and Gondwanaland.
During the gradual breakup of the Earth's original supercontinent, an ancient sea occupied the space between the newly formed northern

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and southern landmasses. This oceanic body was a significant feature for millions of years and served as a site for massive sediment accumulation. The eventual closure of this sea during continental collisions led to the formation of some of the world's most prominent mountain systems. It is a fundamental feature in historical reconstructions of the planetary surface.

134. (C) Endogenetic Force - Weathering
Geomorphic processes are fundamentally divided based on whether they originate from within the Earth or from the surrounding environment. Internal forces build relief through tectonic and magmatic activity, creating mountains and rift systems. External forces, powered by solar energy, focus on the degradation of these structures through physical and chemical breakdown and the transport of debris. Misclassifying these processes can lead to incorrect interpretations of how landscapes are built and eventually worn down by natural agents.

135. (C) Denudation
The combined action of external processes that work to lower the elevation of the land is a central concept in geomorphology. This system includes the disintegration of rock in place, the downhill movement of material, and the active wearing away of the surface by agents like water, ice, and wind. Together, these destructive activities transform high mountain ranges into low-relief plains. This continuous degradation is responsible for shaping the diverse surface features observed across the continental landmasses.

136. (C) Achievement of maximum relief and a well-integrated drainage network.
In the middle stage of a landscape's development, the drainage system reaches its full extent and efficiency. The difference in elevation between mountain crests and valley floors is at its greatest, creating a highly rugged terrain. During this phase, the original high-altitude surfaces are largely consumed by expanding valleys. This represents a transition point where the landscape has reached its most complex structural form before the forces of lateral erosion begin to dominate and reduce the overall relief.

137. (C) Landslides
Specific geomorphic hazards occur when the internal strength of a slope is unable to resist the downward pull of gravity. This instability is often influenced by the angle of the terrain and the nature of the surface materials. External triggers like intense rainfall or ground shaking can initiate the rapid downward movement of rock and soil. These events are fundamentally problems of surface stability and represent a major concern for communities located in steep or geologically active mountainous regions.

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138. (A) 1 and 2
The physical appearance of the Earth is determined by the ongoing competition between relief-building and relief-reducing forces. Internal processes create the primary structures of the crust, such as mountains and plateaus, by adding material or causing uplift. Conversely, external agents like water, ice, and wind continuously act to wear down these features through erosion and weathering. This dynamic balance ensures that the planetary surface is constantly evolving, with new features being built as older ones are destroyed.

139. (C) The cause of the Earth's magnetic field.
The movement of lithospheric plates provides a unified explanation for many major geological phenomena across the globe. It clarifies why seismic activity, volcanic eruptions, and mountain building are concentrated along specific boundaries. It also explains the expansion of ocean basins and the formation of deep trenches. However, the origin of the planetary magnetic field is linked to processes occurring deep within the Earth's liquid outer core, rather than the movement of plates on the surface.

140. (D) Recumbent fold
When rock strata are subjected to extreme compressional stress, they can undergo significant deformation. In some cases, the bending is so intense that the fold becomes overturned until its central axis is nearly parallel to the horizontal plane. This type of structure is common in regions of intense mountain building where the crust has undergone severe shortening. It represents a fundamental type of plastic deformation that significantly increases the complexity and thickness of the Earth's outer shell.

141. (B) Peneplain; Endrumpf
Different geomorphic theories use unique terms to describe the final, low-relief stage of landscape evolution. One foundational model refers to the ultimate erosional surface as a nearly featureless plain formed near base level. Another model uses a different term to describe a similar end state reached through the ongoing interaction between uplift and denudation. Despite the variations in terminology and conceptual approach, both names refer to the nearly flat surface that marks the end of a long erosional cycle.

142. (A) The boundaries of lithospheric plates.
The distribution of major seismic events across the globe is not random but follows a clear pattern. Most earthquakes occur in narrow zones where the Earth's rigid outer plates meet and interact. As these massive segments grind past, collide with, or pull away from each other, immense stress accumulates in the rocks. The sudden release of this energy causes the ground shaking characteristic of an earthquake, making these boundaries the most seismically active regions on the planet.

143. (C) The reaction of water with minerals in a rock, forming new compounds (hydrolysis).
Chemical weathering involves various processes that alter the mineral identity of rocks. One fundamental reaction occurs when minerals react with water to form new chemical substances. This transformation often results in the weakening of the rock's internal structure, making it more susceptible to further disintegration. Unlike physical processes that only break rocks apart, these chemical changes fundamentally alter the material's composition, playing a critical role in soil formation and the long-term decay of the landscape.

144. (A) 1 and 2
Crustal deformation occurs through several types of mechanical responses to tectonic stress. When rock layers are pushed together, they buckle and form folded structures. Conversely, if the crust is pulled apart, it fractures and displaces rock blocks along specific planes. These actions are primary indicators of internal forces at work. Understanding these fundamental mechanics is essential for interpreting the geological history of a region and the forces that have created its various mountain ranges and structural depressions.

145. (B) Uniformitarianism
A fundamental principle in geology suggests that the natural processes occurring today have been operating in a similar manner throughout the Earth's long history. By observing current events like erosion, sediment transport, and volcanic activity, scientists can interpret the features of ancient rocks and landscapes. This concept implies that gradual changes over vast periods of time can lead to significant geological transformations, providing a framework for understanding the planet's past without relying on catastrophic explanations for every feature.

146. (C) Intrusive volcanic landforms
Magmatic activity within the Earth's crust creates a variety of landforms that solidify before reaching the surface. These underground features vary in shape and size, ranging from thin, sheet-like bodies to large mushroom-shaped masses and basin-like structures. Because they form beneath the Earth's skin, they are only revealed after extensive periods of denudation have removed the original overlying rock. These intrusions are significant components of the Earth's internal structure and are fundamental to understanding ancient volcanic history.

147. (C) It assumes that uplift is a rapid, short-lived event followed by a long period of quiescence.
Geomorphic models offer different perspectives on the relationship between tectonic activity and landscape evolution. One prominent theory suggests that the physical form of the land is determined by the ongoing balance between the rate of uplift and the rate of erosion. This differs from models that assume a fixed sequence of stages following a single, rapid uplift event. By focusing on the dynamic interplay of forces, this approach provides a different way to interpret topography and tectonic history.

148. (A) Both A and R are true and R is the correct explanation of A.
The comprehensive process of wearing away the Earth's surface involves several interrelated stages of degradation. It begins with the in-situ breakdown of rock through physical and chemical mechanisms. Subsequently, natural agents like

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water, wind, and gravity remove and transport the resulting debris. Together, these activities constitute the destructive system that levels the landscape. Understanding the connection between the initial breakdown and the eventual removal of material is essential for studying how topography changes over geological time.

149. (B) Convection currents within the Earth's mantle.
The movement of large lithospheric plates is driven by the circulation of heat within the Earth's interior. In this system, hot material rises toward the surface, cools, and then sinks back down, creating a continuous cycle of movement. This internal thermal energy provides the necessary force to move the rigid plates above it. This mechanism explains why plates pull apart at volcanic ridges and collide at other boundaries, making it the fundamental driver of global tectonic activity.

150. (C) An avalanche
In mountainous areas, the accumulation of snow on steep slopes poses a significant danger. The stability of these masses can be compromised by various factors, leading to the rapid and violent downward movement of ice and snow. This geomorphic hazard is primarily a problem of slope stability and environmental conditions. It represents a major risk to human life and infrastructure in high-altitude regions, where gravity and the physical properties of snow combine to create powerful and destructive events.

151. (A) Both Statement I and Statement II are true.
Different geomorphic theories offer unique ways to conceptualize the evolution of landforms. One approach emphasizes a predictable sequence of stages over time, while another focuses on the ongoing balance between tectonic uplift and denudation. These perspectives highlight the complexity of landscape development and the role of internal and external forces. Understanding both time-dependent and time-independent models provides a more complete view of how researchers have historically interpreted the diverse features of the Earth's surface across various regions.

152. (B) Faulting
Linear valleys and elevated, flat-topped mountains are characteristic features of regions where the Earth's crust has been fractured and displaced. These structures are created by tensional or compressional forces that break rock blocks along parallel planes. In this setting, segments of land may either sink or rise relative to their surroundings, resulting in a distinctive stepped topography. These landforms provide clear evidence of internal tectonic stresses and are fundamental to the structural framework of the planetary surface.

153. (A) P-3, Q-4, R-1, S-2
Each type of tectonic plate boundary is associated with specific geological features and famous geographic examples. Zones where plates pull apart are marked by extensive volcanic ridges on the seafloor, while collisions between oceanic and continental plates create high volcanic mountains. Furthermore, interactions between continental plates results in massive mountain systems. Horizontal sliding between plates is characterized by extensive fault lines. Mapping these features to their locations reveals the global pattern of tectonic activity and crustal movement.

154. (C) It is an erosional surface of low relief, formed near the end of a cycle of erosion.
After vast periods of continuous erosion, a landscape eventually reaches its final stage of development. This is characterized by a nearly flat surface that has been worn down close to its base level. The terrain is dominated by gentle slopes and a sluggish drainage system, with most high-relief features completely removed. This nearly featureless plain represents the ultimate result of the destructive forces of denudation acting upon a stable landmass over extensive geological time.

155. (D) Recumbent
Fractures and displacements in the Earth's crust are classified based on the direction of movement and the nature of the forces involved. These include displacements caused by tension, compression, or horizontal shifting. However, some terms specifically refer to wave-like bends in rock layers where the strata remain unbroken but severely deformed. These folded structures represent a plastic response to tectonic stress rather than a brittle fracture, making them

fundamentally different from the various categories of crustal breaks.

156. (D) Pangea
Early geological theories proposed that all major continents were once united in a single, enormous landmass millions of years ago. This massive structure was surrounded by a global ocean and represented a unique phase in planetary geography. Eventually, internal tectonic forces caused this supercontinent to break apart and the resulting pieces to drift into their current positions. This ancient unity is supported by evidence such as matching coastlines and the presence of identical fossils on distant, separated continents.

157. (C) Saturation of slope materials by intense or prolonged rainfall.
Slope stability is significantly influenced by environmental factors, with moisture playing a critical role. When heavy or persistent rainfall enters the ground, it adds significant weight to the surface material and reduces the friction between soil particles. This increased pressure often overcomes the internal strength of the slope, triggering a rapid downward movement of rock and soil. This mechanism explains why most large-scale failures are concentrated during or following major weather events in mountainous or hilly regions.

158. (B) Endogenetic forces originate within the Earth, while exogenetic forces originate at or near the surface.
The forces shaping the Earth's surface are fundamentally classified by their source of origin. Some activities arise from the planetary interior and are driven by internal heat and pressure, focusing on building the crust's primary structures. In contrast, other processes originate from the atmosphere and are powered by external energy. These activities focus on modifying and wearing down the relief through weathering and erosion. Recognizing this distinction is essential for understanding the constructive and destructive mechanisms.

159. (A) W. M. Davis
A classic theory of landscape evolution suggests that as hillslopes are eroded over time, they gradually become less steep. In this model, the initial high-relief terrain is slowly worn down from above, with the sharp angles of the land surface becoming progressively rounded and gentle. This process continues until the entire region is transformed into a low-relief erosional plain. It emphasizes a time-dependent progression where the landscape's overall ruggedness systematically decreases throughout its geomorphic lifecycle.

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160. (A) 1 and 4
Volcanic activity encompasses a wide range of phenomena involving the movement of molten rock both within the crust and onto the surface. Some volcanic structures are built by alternating layers of lava and fragmented material, resulting in large, steep-sided cones. While many landforms are created by eruptions, others are formed by underground intrusions. Understanding these processes is vital for interpreting the physical structure of the Earth's crust and the historical intensity of magmatic events across various geological settings.

161. (C) Youth
In the initial stage of regional development, high potential energy drives aggressive vertical erosion by rivers. This process carves deep, narrow valleys and creates numerous waterfalls and rapids as the drainage system cuts through different rock layers. During this phase, the landscape is rugged with high divides, and the drainage network is not yet fully integrated. These features indicate that the terrain has been recently uplifted and is in the earliest phase of its geomorphic lifecycle.

162. (B) Continental Drift and Sea-Floor Spreading
The modern understanding of global geology was established by combining two revolutionary ideas. One provided evidence that landmasses move horizontally across the globe, while the other identified that new crust is continuously created at volcanic ridges on the ocean floor. Together, these concepts created a unified model that explains not only why continents move but also how the entire planetary surface is constantly being recycled. This synthesis remains the foundational framework for studying all major tectonic processes.

163. (B) Orogenic movements
Internal forces that lead to the large-scale deformation of the Earth's crust are responsible

for building massive mountain systems. These processes involve intense horizontal compression that causes rock layers to buckle, fold, and fracture. This results in the thickening and elevation of the continental crust over millions of years. These constructive events create the world's most prominent high-relief features and are a fundamental part of the tectonic forces that continuously reshape the planetary surface over geological.

164. (D) Soil creep
Mass wasting can occur at extremely slow rates that are barely perceptible to the naked eye. This process involves the gradual downhill movement of soil and loose material under the constant influence of gravity. Over many decades, this movement can be detected by the tilting of trees, fences, and other surface structures. Although slow, this persistent activity is a major factor in the gradual widening of valleys and the rounding of hillslopes in many different environments.

165. (A) Both A and R are true and R is the correct explanation of A.
Although early proponents of moving continents provided significant geological and biological evidence, their theories were initially met with intense skepticism. The primary obstacle was the lack of a plausible physical explanation for how solid continents could migrate through the rigid floor of the ocean. Without a clear understanding of the Earth's interior and a viable driving mechanism, the idea seemed physically impossible to many scientists. It took several decades for mantle convection to be identified.

166. (D) Laccolith
Magmatic activity within the Earth's crust produces various intrusive landforms as molten rock cools and solidifies. One specific type occurs when magma is injected between rock layers with enough pressure to arch the overlying strata into a dome shape. This results in a distinctive mushroom-shaped body with a flat floor. These features are significant indicators of subsurface magmatic pressure and are often only revealed at the surface after extensive periods of erosion have removed the original material.

167. (B) Peneplanation
Natural events that pose a threat to human life and the environment are often driven by powerful geological forces. These include sudden ground shaking, explosive volcanic eruptions, and the rapid failure of steep slopes. While these hazards represent active and sometimes catastrophic modifications of the landscape, other terms refer to long-term evolutionary processes or end states of erosion. Distinguishing between active hazards and general geomorphic stages is important for understanding the different timescales on which geological forces operate.

168. (A) Both Statement I and Statement II are false.
Environmental conditions significantly influence the type of weathering that dominates a region. Chemical processes are most effective in warm, humid climates where water and heat accelerate mineral decomposition. In contrast, physical mechanisms like the expansion of freezing water are most active in cold environments with fluctuating temperatures. Understanding the relationship between climate and the breakdown of rock is essential for studying soil formation and landscape evolution across different geographic zones, as these factors determine the rate.

169. (B) The initial land surface before uplift begins.
In specific geomorphic models, the evolution of a landscape is traced from a primary starting point. This initial surface represents the terrain before it is subjected to significant tectonic uplift and the subsequent intensification of erosion. As internal forces begin to raise the land, the agents of denudation act upon this original surface to create the rugged features of a young landscape. Identifying this starting point is essential for analyzing the total history of regional landform development.

170. (A) 2, 3, 1
Tectonic features follow a predictable sequence across the ocean floor from the site of crustal creation to the site of its recycling. New seafloor is formed at volcanic ridges in the middle of the basin. As this material moves outward, it crosses vast, flat plains before eventually reaching deep depressions where it is forced back into the mantle. This global conveyor system is responsible for the continuous renewal of the oceanic crust and the movement of continental landmasses.

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171. (D) Strike-slip fault
Fractures in the Earth's crust can be classified by the direction of movement between rock blocks. In some zones, the displacement occurs horizontally along the line of the fracture rather than vertically. This lateral movement is common along certain plate boundaries and can extend for hundreds of kilometers. These faults are significant because they accommodate horizontal tectonic stresses without causing large-scale uplift or sinking, although they are frequent sources of powerful seismic events due to frictional resistance.

172. (B) Gravity and solar energy
Surface processes that wear down the landscape are powered by external energy sources. The primary driver is the energy from the sun, which fuels the circulation of water and air, leading to precipitation and wind. Additionally, gravity provides the necessary force for water to flow downhill and for loose material to move down slopes. Together, these influences enable the constant breakdown and redistribution of rock and soil, working systematically to level the Earth's surface relief.

173. (C) Isolated, erosion-resistant hills rising above a peneplain in the old age stage.
In the final stage of landscape evolution, most of the terrain has been worn down to a nearly level erosional plain. However, some portions of the bedrock may be more resistant to weathering and erosion than the surrounding areas. These resistant masses remain as isolated hills that rise above the general level of the featureless plain. These residual features are characteristic of an old landscape and serve as evidence of the long-term degradation of the original high relief.

174. (B) 2, 3 and 5
Prominent geomorphic models emphasize different aspects of landscape evolution. One specific approach focuses on the ongoing relationship between internal tectonic uplift and external denudation rather than fixed chronological stages. This theory proposes that the physical form of a slope reflects the current balance between these forces, potentially leading to the replacement of steeper segments with gentler ones. Understanding these concepts is essential for analyzing how topography responds dynamically to changing rates of crustal movement and erosion.

175. (C) Subduction of an oceanic plate beneath a continental plate.
The world's longest mountain range is a direct result of the interaction between two lithospheric plates of differing densities. As the denser oceanic plate is forced beneath the lighter continental plate, intense horizontal compression and volcanic activity occur. This process leads to the folding and uplift of the continental margin, creating high peaks and deep trenches. This tectonic setting is a major driver of mountain building and is responsible for frequent seismic and volcanic activity along the coast.

176. (D) Weathering - Endogenetic
Geomorphic processes are classified based on whether they originate from within the Earth or from the surrounding environment. Internal forces build relief through activities like folding and vulcanism, while external forces work to wear it down. Processes like the physical and chemical breakdown of rocks are driven by atmospheric energy and gravity, placing them in the category of external agents. Misidentifying the origin of these processes can lead to incorrect conclusions about how landscapes are constructed and modified.

177. (D) Lava dome
Volcanic structures vary significantly depending on the properties of the erupted material. When magma is highly viscous and silica-rich, it does not flow easily over long distances. Instead, it accumulates directly above the vent, building a steep-sided, mound-shaped feature. These structures are distinct from wide, gently sloping volcanoes formed by fluid lava. They often grow within the craters of larger volcanoes and represent a specific type of magmatic activity characterized by slow extrusion and high internal pressure.

178. (B) The sudden release of accumulated stress along a fault.
Seismic activity is primarily caused by the mechanical behavior of rock masses under tectonic pressure. As crustal plates move, friction prevents them from sliding smoothly past each other, causing immense energy to build up along

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fractures. When the internal strength of the rock is eventually exceeded, the energy is released almost instantaneously through rapid displacement. This movement sends vibrations through the ground, resulting in the shaking characteristic of an earthquake and demonstrating the dynamic nature of the crust.

179. (D) Statement I is false, but Statement II is true.
Modern geology describes the Earth's rigid outer layer as being fragmented into several large segments rather than being a single, continuous shell. These plates are in constant motion, driven by internal heat. At boundaries where plates pull apart, magma rises to the surface, creating long volcanic ridges and new crust. This process is fundamental to the expansion of ocean basins and provides a clear mechanism for the movement of continents across the planetary surface over geological time.

180. (B) Granular disintegration
Certain types of rock, such as granite, are composed of multiple minerals that react differently to temperature changes. In environments with extreme daily temperature fluctuations, these constituent minerals expand and contract at varying rates. Over time, this differential stress causes the internal bonds between the minerals to weaken, leading the rock to crumble into individual sand-like grains. This mechanical process is a major factor in the physical breakdown of coarse-grained rocks in arid and semi-arid regions.

181. (B) Epeirogeny
Large-scale vertical movements of the Earth's crust can occur over entire continents or regions without causing significant folding or fracturing. These processes involve the broad uplift or sinking of the landmass, often in response to internal thermal changes or the addition and removal of heavy weight like ice sheets. This type of tectonic activity is distinct from the more localized and intense deformation that builds mountain ranges. It plays a critical role in shaping continental coastlines and elevations.

182. (A) Both A and R are true and R is the correct explanation of A.
Large masses of intrusive rock can undergo significant physical transformation when exposed at the surface. As the weight of overlying material is removed through erosion, the internal pressure on the buried rock is released. This causes the rock to expand slightly and fracture along curved planes parallel to its surface. Over time, these outer layers peel away in thin sheets, resulting in the formation of distinctive rounded domes. This process is a classic example of mechanical weathering.

183. (C) Rockfall
The collective movement of surface materials under the direct influence of gravity encompasses a wide range of events. One common process involves the sudden and rapid free-fall of individual rock fragments or large masses from steep cliffs and mountain faces. These events are primary examples of how gravity directly modifies high-relief terrain without the need for a specific transporting agent like flowing water. They contribute significantly to the retreat of steep slopes and the accumulation of debris at their base.

184. (B) It assumes a simple, uninterrupted progression that is rare in nature due to tectonic and climatic complexities.
Classic models of landscape evolution have been criticized for oversimplifying the geological history of many regions. These theories often propose an orderly sequence of stages occurring under stable conditions over vast periods of time. However, in reality, the planetary surface is frequently subjected to renewed tectonic activity and significant shifts in climate. These disruptions can reset or modify the evolutionary path of a landscape, making a simple, continuous progression through youth and maturity difficult to find.

185. (A) P-3, Q-1, R-2, S-4
Different tectonic settings are directly responsible for the creation of unique landforms at plate boundaries. Areas where continental crust is pulled apart create linear rift valleys, while similar activity in the oceans results in volcanic ridges. When plates collide, they can produce chains of volcanic islands or massive continental mountain ranges. Mapping these features to their specific tectonic environments highlights the diverse ways in which the Earth's dynamic outer

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shell interacts to shape the diverse topography of the planet.

186. (B) A pyroclastic flow
Explosive volcanic activity can generate powerful and extremely dangerous surface events. One such hazard involves the rapid downward movement of superheated gas, ash, and rock fragments from a collapsing eruption column. These fast-moving clouds can travel at hundreds of kilometers per hour and are capable of destroying everything in their path. This phenomenon is a direct consequence of internal magmatic processes and represents one of the most destructive forces associated with active volcanic mountain systems.

187. (C) Denudation
The overall leveling of the Earth's surface relief is achieved through the integrated action of several destructive processes. This system begins with the physical and chemical disintegration of rock, followed by the downhill movement of material under gravity and its eventual removal by natural agents. Together, these activities work systematically to wear down the continental landmasses. This continuous degradation is responsible for transforming rugged mountains into low-relief plains over geological time, maintaining a dynamic balance with internal building forces.

188. (B) Folds and reverse faults.
When segments of the Earth's crust are pushed together by horizontal tectonic pressure, the rock layers respond by buckling and fracturing. This compression causes the rock strata to warp into wave-like structures or to break and shift upward along diagonal planes. These processes lead to the shortening and thickening of the crust, which is the primary mechanism for the formation of massive mountain ranges. They represent fundamental ways the crust accommodates internal pressure through plastic and brittle.

189. (C) The disappearance of most waterfalls and rapids.
During the middle phase of landscape evolution, the drainage system reaches a state of relative stability and efficiency. Rivers have cut down through the initial irregularities of the terrain, and their profiles have become more regular. As a result, many of the high-energy features found in younger landscapes, such as waterfalls and rapids, are gradually worn away. This stage is marked by the widening of valleys and the development of more integrated drainage patterns as the landscape matures.

190. (D) 1, 2, 3 and 4
Geomorphic processes are systematically classified based on their origin and the nature of their movement. Internal forces that build relief include both slow, long-term crustal deformations and sudden events like earthquakes and eruptions. Conversely, external processes like weathering and erosion act to wear down the landscape. Understanding this categorization is essential for studying how internal building and external degradation interact to shape the planetary surface. All these processes together provide a comprehensive view of global geomorphology.

191. (D) The centers of stable continental shields
Volcanic activity is not randomly distributed across the planet but is highly concentrated in specific tectonic settings. Most volcanoes occur at boundaries where crustal plates meet, collide, or pull apart. Significant magmatic activity also occurs over stationary heat plumes within the mantle. However, large regions of ancient and stable crust far from active boundaries typically lack the tectonic stresses and magma sources necessary for volcanic eruptions. These stable interior regions contrast sharply with the geologically active margins.

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192. (C) King's Pediplanation Cycle
A significant theory of slope development describes the formation of vast plains through the lateral retreat of high-relief areas. This process involves the landmass moving backward while maintaining its steepness, leaving behind gently sloping erosional surfaces at the base. Over time, these base plains expand and merge as the original mountain masses are systematically consumed. This model is particularly useful for explaining the development of unique landscapes in arid environments where scarp retreat is a dominant geomorphic process.

193. (A) Both Statement I and Statement II are true.

Rocks within the Earth's crust respond to tectonic stress in different ways depending on their depth, temperature, and pressure. Near the surface, where rocks are cooler and more rigid, they often fracture and shift along faults when subjected to intense pressure. However, deeper within the crust, where temperatures are higher, rocks may behave more plastically and buckle into wave-like folds without breaking. Understanding these distinct brittle and ductile responses is essential for interpreting the complex structural features of.

194. (C) Gondwanaland
During the fragmentation of the Earth's original supercontinent, two enormous landmasses were formed, separated by an ancient sea. The southern mass eventually broke into the continents of Africa, South America, Antarctica, and Australia, as well as the Indian subcontinent. Geological evidence from these distant regions, including matching rock types and fossils, confirms their ancient connection. This massive southern structure played a critical role in global geography until its final breakup during the Mesozoic and Cenozoic eras.

195. (C) Mass Wasting
The movement of surface materials down a slope under the primary influence of gravity represents a major category of geomorphic processes. This includes a wide spectrum of events, from the slow, imperceptible creep of soil to the sudden and violent collapse of mountainsides and snowpacks. These activities do not require a specific transporting agent like wind or water to occur. They are fundamental to the evolution of hillslopes and play a critical role in the widening of river valleys.

196. (C) Uplift is a rapid, short-lived event that is completed before erosion begins.
A classic model of landscape evolution is based on a specific assumption about the relationship between tectonic activity and erosion. It proposes that a landmass is pushed upward by internal forces over a very short geological time frame. Once this initial uplift is complete, the region remains tectonically stable, allowing the agents of denudation to wear the terrain down through a sequence of predictable stages. This framework provides a systematic way to study the development and decay of landforms.

197. (B) A river meander
Surface features that are created by natural agents of transport represent the impact of external forces on the landscape. One prominent example is the winding curve of a river as it flows across a floodplain. These bends are carved by the kinetic energy of running water, which is powered by solar energy and gravity. Unlike internal tectonic structures that build relief, these features reflect the active modification and redistribution of surface material by environmental processes in a low-energy setting.

198. (A) Both A and R are true and R is the correct explanation of A.
The geological expansion of a major ocean basin is a direct consequence of tectonic activity on the seafloor. Along a volcanic ridge system, lithospheric plates are pulling apart, allowing magma to rise from the mantle and solidify into new crust. This continuous addition of material pushes the older crust outward, causing the ocean to grow wider over vast periods of time. This process of crustal creation at divergent boundaries is a fundamental mechanism driving the movement of continents.

199. (D) Thrust fault
When the Earth's crust undergoes intense horizontal compression, rock layers may eventually fracture and shift. A specific type of displacement occurs when one block of rock is pushed upward and over the adjacent block at a very shallow angle. This low-angle displacement is common in regions of extreme mountain building and leads to significant crustal shortening. It represents a powerful tectonic mechanism that allows large sheets of rock to be transported horizontally over many kilometers during continental collisions.

200. (A) P-3, Q-4, R-1, S-2
Foundational theories in geology and geomorphology provide unique terms to describe various aspects of the Earth's dynamic surface. These include names for original supercontinents, the mechanisms of seafloor growth, and different descriptions of the final stages of landscape evolution. Mapping these

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terms to their respective theoretical frameworks reveals the historical development of scientific thought regarding crustal movement and the long-term degradation of the land. Each concept offers a different perspective on the forces that shape our planet.

201. (B) Divergent continental boundary
Tectonic forces that pull the continental crust apart create distinctive linear depressions. In certain regions, this tensional stress has caused the crust to thin and fracture, leading to a massive system of valleys and escarpments. This ongoing process is a precursor to the eventual breakup of the landmass and the formation of a new ocean basin. It represents a major constructive and destructive phase of continental evolution, demonstrating the powerful impact of internal forces on the planetary surface.

202. (C) Hydrolysis
Chemical weathering involves the decomposition of minerals through various reactions with environmental elements. One fundamental process occurs when minerals react with water to form entirely new chemical substances. This transformation often results in the weakening of the rock's structure as original minerals are replaced by softer ones, such as clays. This molecular-level change is a primary factor in the breakdown of rocks like granite and is essential for the formation of soil and the shaping of landforms.

203. (C) Broad floodplains
In the early stage of regional development, high potential energy causes rivers to focus their power on cutting vertically into the bedrock. This results in steep-sided valleys and a rugged topography where mountains and hills are separated by narrow valley floors. Because the drainage system is still immature, there is little lateral erosion to create wide, level plains along the riverbanks. These features are only developed in the later stages of the geomorphic cycle as the landscape matures and relief.

204. (D) 1, 2, 3, 4, and 5
Internal forces originating from the Earth's heat and pressure are responsible for creating the foundational structures of the crust. These activities include the folding and buckling of rock layers, the displacement of crustal blocks along faults, and the movement and eruption of molten magma. Together, these constructive processes build features like mountains, volcanic cones, and deep structural valleys. Understanding the origin of these diverse landforms is essential for interpreting the tectonic and magmatic history of any given geographic region.

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205. (A) rock and soil; snow and ice
Mass wasting events are classified based on the speed of movement and the type of material involved. Some rapid downhill movements consist primarily of weathered rock fragments and surface soil. Other similar events occur specifically in high-altitude environments and involve the sudden failure of accumulated frozen precipitation. While both are driven by gravity and slope steepness, the difference in material is fundamental to their occurrence, seasonal patterns, and the specific hazards they pose to surrounding environments and human.

206. (C) Action of wind
Geomorphic forces that derive their energy from sources outside the Earth's interior are responsible for wearing down the planetary surface. These activities are powered by the sun and gravity, enabling agents like air and water to move and modify materials. By breaking down rocks and transporting the debris, these forces systematically reduce the height of mountains and hills. This continuous action contrasts with internal relief-building forces, as the primary goal of these external agents is the gradual leveling.

207. (C) Statement I is true, but Statement II is false.
The occurrence of major geomorphic hazards like earthquakes and volcanic eruptions is not random. Instead, these powerful events are highly concentrated in specific zones where lithospheric plates interact. By identifying the locations of plate boundaries, scientists can better understand where seismic and volcanic activity is most likely to occur. This framework provides a vital tool for hazard assessment and disaster management, revealing the direct link between the Earth's internal tectonic movements and the destructive manifestations on the surface.

208. (D) anticline; syncline

Horizontal tectonic pressure causes rock layers to buckle into wave-like patterns. These folds consist of alternating upward and downward bends. The arched portion of the fold typically represents a high point in the structural arrangement of the rock, while the trough-like portion represents the lower segment. These features are fundamental in folded mountain belts and provide important clues about the direction and intensity of past crustal compression. They represent a plastic response of the crust to immense internal stresses.

209. (A) The rate of uplift is accelerating.
In specific models of landscape evolution, the geometry of a hillslope is viewed as an indicator of tectonic intensity. A convex-upward profile, where the slope becomes steeper toward the top, is associated with a phase of increasingly powerful internal building forces. This means that the Earth's crust is rising at a rate that is not only faster than erosion but is also gaining speed over time. This approach link surface morphology directly to the dynamic behavior of the interior.

210. (C) Splitting of a rock by a tree root.
Weathering processes can be driven by biological activity that exerts mechanical pressure on the surrounding environment. When plants grow in the fractures of a rock, their root systems expand with significant force, acting like a wedge that pushes the rock apart. This physical breakdown occurs without any chemical change to the minerals themselves. This interaction demonstrates how living organisms contribute to the disintegration of rocks, which is a key step in soil formation and the overall degradation of the landscape.

211. (C) Volcanoes and earthquakes around the Pacific Ocean basin.
A massive belt of intense geological activity surrounds one of the Earth's major ocean basins. This region is characterized by frequent seismic events and numerous active volcanoes, resulting from the complex interactions between various lithospheric plates. Most of these plates are being recycled through subduction, leading to the generation of magma and the release of seismic energy. This alignment of geological hotspots creates a distinctive pattern that is a primary feature of global tectonics and hazard risk.

212. (C) Structure, Process, and Stage
The development and physical appearance of any landform are determined by three fundamental variables working together. The first refers to the nature and arrangement of the bedrock. The second involves the specific environmental agents, such as water or ice, that are modifying the surface. The third represents the duration of time these agents have been active. This framework suggests that landscapes follow an orderly sequence of change, allowing scientists to describe and predict how topography evolves over vast periods.

213. (A) Both A and R are true and R is the correct explanation of A.
The shaping of the planetary surface involves a dynamic interplay between forces that build relief and those that wear it down. Internal tectonic and magmatic activities generate potential energy by creating high-elevation features like mountain ranges. These are considered stress-inducing forces. Conversely, external agents like erosion and weathering act to release this built-up energy by removing and relocating material, eventually lowering the landscape. This continuous cycle of stress inducement and release maintains the ever-changing and complex topography of the Earth.

214. (B) Tectonics
The overall leveling of the Earth's surface is achieved through a collection of external processes that work together to wear down high-relief areas. This destructive system includes the in-situ breakdown of rock, the downhill movement of debris under gravity, and the active removal of material by natural agents. However, the internal forces that lead to the deformation of the crust and the building of structural features like mountains are constructive and originate from within, placing them in a different category.

215. (C) Pyroclastic flow
Explosive volcanic eruptions can produce powerful and fast-moving hazards that originate from the collapse of ash columns or lava domes. These events consist of a superheated mixture of gas, ash, and volcanic rock fragments that move down mountain slopes at extremely high speeds. Capable of destroying everything in their path, they represent one of the most lethal

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forces in magmatic activity. Their occurrence is a direct manifestation of the intense internal energy released during specific types of volcanic eruptions.

216. (B) 1, 2 and 3
Fractures and displacements in the Earth's crust are classified based on the direction of movement and the nature of the forces involved. Some are caused by tensional stress that pulls the crust apart, while others result from compressional forces that push rock blocks upward. Horizontal displacement also occurs along certain fault lines. However, some landforms created by these fractures are elevated features rather than depressions. Understanding these basic mechanical relationships is essential for interpreting the tectonic and structural history of a region.

217. (B) Involves the movement of rigid lithospheric plates rather than just continents.
Modern geology describes the Earth's rigid outer shell as being fragmented into several large segments rather than being a single, continuous unit. These plates, which include both continental masses and ocean basins, move as unified units over a more fluid interior. This distinction is critical because it identifies the true scale of moving crustal segments and explains how new seafloor is created and recycled. This comprehensive theory provides the foundational framework for understanding all major tectonic and geological events.

218. (C) The greatest relief differentiation and a highly integrated drainage system.
During the middle phase of landscape evolution, the drainage network reaches its most efficient and complex state. The difference in elevation between the highest and lowest points of the terrain is at its maximum, resulting in a highly rugged topography. During this stage, the original upland surfaces have been largely removed by expanding valleys, and the vertical power of the rivers is balanced by lateral widening. This represents a transition point before the landscape begins to flatten toward its final.

219. (D) Davis - Slope Replacement
Geomorphologists have proposed various models to explain how hillslopes change over geological time. One classic theory suggests that slopes become progressively gentler as they age. Another model proposes that a slope maintains its steepness as it moves backward into a mountain mass. A third perspective argues that steeper segments are systematically replaced by gentler ones from the base upward. Misattributing these concepts to their respective proponents can lead to confusion about how different environmental and tectonic forces.

220. (B) 2, 3, 1
The destruction of the Earth's surface relief follows a logical sequence of interrelated processes. It begins with the in-situ breakdown and decomposition of rock into smaller fragments. Once the material is loosened, it is then removed or detached by natural agents like flowing water or wind. Finally, this debris is transported away from its original location to be deposited elsewhere. This systematic progression from initial disintegration to eventual relocation is a fundamental part of the destructive system that reshapes the planetary topography.

221. (C) Lahar
In volcanic regions, a specific geomorphic hazard can occur when a large volume of water mixes with loose volcanic ash and debris. This mixture creates a powerful and fast-moving mudflow that travels down river valleys and mountain slopes. These events are often triggered by heavy rainfall or the rapid melting of snow and ice during an eruption. Capable of transporting massive boulders and destroying entire communities, they represent a significant risk in mountainous areas with active or recent volcanicity.

222. (B) Lithosphere and asthenosphere
The Earth's rigid outer shell remains in a state of gravitational balance as it floats on the more plastic layer beneath it. This principle suggests that the elevation of the crust is determined by its density and thickness, similar to how an object floats in a fluid. When mass is added or removed through geological processes, the crust adjusts vertically to regain equilibrium. This ongoing adjustment is essential for understanding the stability and long-term elevation changes of the continental and oceanic.

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223. (B) Sheet-like intrusion that cuts across the bedding of the host rock.
Magmatic activity within the Earth's crust creates a variety of landforms that solidify before reaching the surface. One specific type occurs when magma is forced into fractures that cut across the existing layers of the host rock. These sheet-like bodies can be oriented at any angle but are always discordant with the surrounding rock strata. They provide important information about the direction of internal tectonic stresses and the historical patterns of magmatic movement within the rigid outer crust.

224. (B) Pole-fleeing force and tidal forces
Early scientific attempts to explain the horizontal movement of continents relied on forces related to the Earth's rotation and the gravitational pull of the moon and sun. One proposed mechanism suggested that continental masses tended to migrate away from the poles toward the equator. Another theory focused on the influence of tidal interactions on the crust. Although these specific forces were later proven insufficient to move massive plates, they were central to the original conceptualization of a dynamic and changing surface.

225. (B) L. C. King
A significant theory of slope development describes the evolution of landscapes in arid and semi-arid regions through the formation of specific landforms. These include steep-sided, flat-topped mountains that are surrounded by broad, gently sloping erosional surfaces. As the steep cliffs move backward into the highland mass, these base plains expand and eventually merge. This model emphasizes the importance of lateral retreat and the creation of vast, low-relief surfaces through the systematic consumption of the original mountain masses.

226. (A) Both Statement I and Statement II are true.
The physical appearance of the Earth is shaped by the ongoing competition between forces that build relief and those that wear it down. Internal processes, driven by the planet's heat, create primary features like mountain belts and plateaus. Conversely, external agents like water, wind, and ice act to break down these high-relief structures through weathering and erosion. This dynamic interaction ensures that the planetary surface is constantly being modified, with internal building and external degradation maintaining a complex geological balance.

227. (B) hypocenter; epicenter
When a seismic event occurs, it originates from a specific point within the Earth's crust where the initial rupture happens. From this location, seismic waves radiate outward in all directions. The point on the planetary surface that is vertically closest to this internal source is of great importance for scientific study and emergency response. Identifying both the internal origin and its corresponding surface location is essential for measuring the intensity, depth, and geographic impact of an earthquake on the surrounding area.

228. (C) Weathering
The disintegration and decomposition of rock in its original location is a fundamental geomorphic process. This activity is driven by both physical and chemical mechanisms that break down solid rock into smaller fragments and new minerals. Over vast periods of time, this persistent breakdown results in the accumulation of loose material that eventually becomes the foundation for soil. This in-situ transformation is a critical step in the overall modification of the landscape and the support of terrestrial life and ecosystems.

229. (A) P-4, Q-3, R-2, S-1
Various geological and geomorphic terms describe specific structures, features, and processes that shape the Earth's surface. These include arched rock layers, linear depressions between faults, the overall reduction of continental elevation, and large basins formed by volcanic collapse. Mapping these terms to their respective definitions provides a comprehensive framework for understanding how tectonic and magmatic forces, along with external erosion, work together to create the diverse and complex topography observed across the globe in various geological settings.

230. (B) The age of the oceanic crust increases with distance from the mid-ocean ridges.
Scientific evidence for the continuous creation of new oceanic crust is found in the physical properties of the seafloor. As magma rises and solidifies at volcanic ridges, it creates new material that pushes older sections away.

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Consequently, the rocks located farthest from the ridges are the oldest, while those nearest the ridge are the youngest. This pattern confirms that the ocean basins are expanding over time, providing the primary mechanism for the movement of continents across the planetary surface.

231. (C) Batholith
Linear valleys, elevated mountain blocks, and steep cliffs are all characteristic landforms created by the fracturing and displacement of the Earth's crust along faults. However, some large-scale features are the result of massive magmatic intrusions that solidify deep within the crust rather than through tectonic breaking. These underground bodies are only revealed after millions of years of erosion have removed the original material. They represent a different type of geological feature, focusing on magmatic activity rather than structural displacement.

232. (B) 1, 3 and 5
Major geomorphic hazards are primarily expressions of powerful internal forces that reshape the Earth's surface. Seismic events result from the sudden release of energy along fractures, while other hazards can be initiated by these vibrations. Additionally, environmental factors like heavy rain can trigger the failure of steep slopes. Understanding that most of these events are concentrated along plate boundaries or influenced by tectonic stresses is essential for accurate risk assessment and the scientific study of how geological forces.

233. (B) William Morris Davis
A foundational concept in the study of landscapes suggests that landforms are the product of three primary factors. These include the geological arrangement and nature of the rock, the specific environmental processes at work, and the total duration of time these forces have been active. This framework implies that any landscape will undergo a predictable sequence of changes as it is worn down. It has been a central theme for describing the orderly and systematic development of surface features.

234. (B) The formation of mountains.
Internal tectonic forces that lead to the large-scale folding and buckling of the Earth's crust are responsible for building massive mountain systems. These processes involve intense horizontal compression that causes rock layers to thicken and rise over millions of years. These constructive events create the world's most prominent high-relief features and are a fundamental part of the tectonic movements that continuously reshape the planetary surface. They represent the primary mechanism for adding complexity and elevation to the continental landmasses.

235. (C) Peneplain
In the final stage of a classic geomorphic cycle, the landscape reaches a state of minimal relief. After millions of years of continuous erosion, the terrain has been worn down to a nearly level surface close to its base level. This featureless plain is the ultimate goal of denudation acting upon a stable landmass. Only a few resistant hills may remain as isolated remnants of the original high topography, signifying the completion of a long-term sequence of evolutionary development and decay.

236. (C) The extremely rapid free-fall of individual rocks from a cliff or steep slope.
Specific types of mass wasting occur when rock material loses its attachment to a steep face and descends through the air. These events involve individual fragments or large masses falling rapidly under the direct influence of gravity. They are common in high-relief areas with exposed cliffs and are major contributors to the retreat of mountain slopes. Unlike slow movements, these are almost instantaneous and represent a direct way that gravity modifies the landscape without the need for a transporting agent.

237. (C) The lowering of a landmass and the carving of valleys.
The continuous action of surface processes that wear away the Earth's crust results in significant long-term changes to topography. This systematic reduction of elevation is achieved through the physical and chemical breakdown of rocks and the removal of the resulting debris. As a landmass is degraded, it loses relief and becomes increasingly flat over time. This overall leveling of the land is the primary result of destructive external forces working in competition with the internal building processes of the.

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238. (A) Both A and R are true and R is the correct explanation of A.
The Earth's highest mountain range is a direct product of the ongoing collision between two massive lithospheric plates. As these landmasses converge at a specific boundary, the intervening crust is buckled and uplifted to extreme heights. This tectonic process continues to drive elevation gain and frequent seismic activity in the region today. The mountains are a primary example of how the horizontal movement of plates creates intense vertical relief and dynamic geological zones on a global scale.

239. (B) Physical weathering
Rocks can be broken down by mechanical stresses that originate from environmental changes. In regions with significant temperature fluctuations, the outer layers of a rock expand during the heat of the day and contract at night. Over time, this repeated cycle creates internal stress that causes the rock to fracture and disintegrate into smaller fragments. This breakdown occurs without any chemical alteration to the minerals themselves, making it a fundamental part of the mechanical modification of the Earth's surface.

240. (B) Davis
A foundational geomorphic theory proposes that landscapes evolve through an orderly and predictable sequence of stages. This cyclical progression begins with a newly uplifted landmass and ends with a nearly featureless plain of low relief. Each stage is characterized by distinct physical features and drainage patterns. This framework has been widely used to describe how the Earth's surface is systematically worn down by the forces of erosion over vast periods, emphasizing the time-dependent nature of landform development.

241. (A) Both Statement I and Statement II are true.
The dynamic behavior of the Earth's surface is driven by energy that originates from deep within the planetary interior. This internal heat and pressure lead to diverse geological events, including the bending of rock strata, the fracturing of the crust, and the movement of molten magma. Together, these manifestations demonstrate the powerful impact of internal forces on the physical structure of the crust. Understanding the link between this internal energy and surface features is fundamental to the study of modern.

242. (A) Both Statement I and Statement II are true.
Prominent geomorphic models offer unique perspectives on how hillslopes and landscapes change over time. One significant approach focuses on analyzing the physical form of a slope as an indicator of the current balance between internal tectonic uplift and external denudation. By studying these surface profiles, geomorphologists can infer the relative intensity of the forces that have shaped the region. This dynamic perspective link topography directly to the ongoing geological processes, highlighting the complexity and variability of landform evolution.

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243. (A) Divergent
A massive underwater volcanic ridge system represents a boundary where two large lithospheric plates are moving away from each other. In this setting, the crust is stretched and thinned, allowing magma from the mantle to rise and solidify into new seafloor. This continuous process of crustal creation is essential for the expansion of ocean basins and the global movement of continents. It demonstrates the constructive nature of certain tectonic boundaries where new material is added to the Earth's rigid outer shell.

244. (C) Lahar
Explosive volcanic activity can lead to the formation of powerful mudflows when volcanic debris is mixed with significant amounts of water. These fast-moving flows can be triggered by heavy rainfall or the rapid melting of mountain snow and ice. Capable of traveling long distances down river valleys, they pose a severe threat to human settlements and the surrounding environment. This geomorphic hazard is a direct consequence of internal magmatic processes interacting with external hydrological factors in active volcanic.

245. (B) Denudation
The forces shaping the Earth's surface are fundamentally classified by their source of origin and their impact on relief. Internal processes, driven by heat and pressure, create the structural framework of the crust through tectonic and magmatic activity. Conversely, external agents act

upon these features to wear them down through a collection of destructive processes. Misidentifying the category of these forces can lead to incorrect conclusions about how the planetary topography is constructed and eventually leveled by various environmental agents.

246. (C) 1, 2 and 3
The modern theory describing the Earth's dynamic crust identifies several fragmented segments that move as unified units. These rigid plates reside above a more fluid interior layer, with their movement driven by internal thermal circulation. While most major geological events are concentrated along the edges of these plates, the plates themselves can vary in composition. This comprehensive system explains the global distribution of tectonic activity and provides a unified framework for understanding the history and future of the planetary surface.

247. (B) Reverse fault with a low angle of dip.
Intense horizontal compression in the Earth's crust can cause rock layers to buckle and eventually fracture. A specific type of displacement happens when one block is forced upward and over another at a very shallow angle. This low-angle displacement is a major tectonic mechanism in active mountain belts, leading to significant crustal shortening. It allows large sheets of rock to be transported horizontally over many kilometers, reflecting the powerful impact of compressional stress during major mountain-building events.

248. (B) Rapid uplift of a landmass to its maximum elevation.
A classic model of landscape evolution assumes a specific starting condition for the geomorphic cycle. It proposes that a segment of the Earth's crust is pushed upward almost instantaneously in geological terms. Once the land has reached its peak elevation, the internal building forces cease, leaving the terrain to be acted upon by the agents of erosion. This initial uplift creates the high relief and potential energy necessary for the systematic sequence of stages that follow in the development.

249. (A) The Sun
All external geomorphic processes that work to wear down the Earth's surface are powered by energy from a source outside the planetary interior. This energy drives the atmospheric circulation of air and water, leading to precipitation, wind, and ice movement. By enabling these natural agents to break down rock and transport debris, this external power source is ultimately responsible for the constant modification and eventual leveling of the landscape. It represents the fundamental driver for the destructive forces.

250. (B) P-4, Q-1, R-2, S-3
Different types of internal and external forces lead to the creation of specific landforms on the Earth's surface. Compressional tectonic stresses result in folded mountain belts, while tensional forces create linear rift valleys. External agents like flowing water carve steep-sided valleys through erosion. Magmatic activity creates distinctive volcanic cones through the eruption of molten material. Mapping these forces to their resulting features highlights the complex and dynamic nature of the planetary surface and the various mechanisms involved in its evolution.

251. (B) Pangaea
Alfred Wegener proposed that all current continents were once part of a single, massive landmass known as Pangaea. This supercontinent existed during the late Paleozoic and early Mesozoic eras before it began to fragment and drift. The concept explains the similar geological and fossil records found across different continents that are now separated by vast oceans today.

252. (A) The direct measurement of continental movement via satellite geodesy.
While modern technology allows for precise measurement of continental movement through satellite geodesy, this evidence was not available when the theory was first proposed. Historical evidence focused on the jigsaw fit of coastlines, matching fossil records like Mesosaurus, and similar rock formations. These early observations suggested that continents were once connected despite lacking contemporary data from satellite technology.

253. (C) The absence of a plausible mechanism to explain the movement of continents.
Scientific resistance to the theory primarily stemmed from the lack of a known physical

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mechanism to explain how massive continents could plow through the rigid oceanic crust. Critics argued that the forces proposed were insufficient to move landmasses. This explanatory gap remained until the discovery of seafloor spreading and the development of plate tectonics provided the necessary mechanical framework.

254. (D) an foundational concept that was later expanded upon.
The theory served as a critical precursor to the modern understanding of global tectonics by challenging the static view of the Earth's crust. Although it initially lacked a complete mechanical explanation, its core ideas about continental movement were revolutionary. It provided the essential groundwork that scientists later built upon to develop the comprehensive and widely accepted plate tectonics theory.

255. (C) continents were once situated at different latitudes than they are today.
Paleoclimatic evidence, such as ancient glacial deposits in tropical regions and coal seams in temperate areas, suggests that landmasses have shifted their positions over millions of years. These indicators imply that continents were once located in different climatic zones or latitudes compared to their current positions. This movement explains why geological records often contradict the current local climates.

256. (B) Convection currents within the Earth's mantle.
The movement of tectonic plates is primarily driven by thermal convection within the Earth's mantle. Heat from the core causes magma to rise, cool, and then sink back down in a continuous cycle. This circulation creates a dragging force on the overlying lithospheric plates, causing them to move slowly across the more ductile asthenosphere layer over geological time.

257. (D) Divergent boundaries
New lithospheric crust is formed at divergent boundaries, where tectonic plates move away from each other. As the plates separate, magma rises from the mantle to fill the gap, cooling and solidifying to create new oceanic crust. This process is most prominent at mid-ocean ridges, where it continuously expands the ocean floor through the mechanism of seafloor spreading.

258. (A) a deep-sea trench.
At convergent boundaries where two tectonic plates collide, one plate is often forced beneath the other into the mantle. This subduction process creates deep-sea trenches, which are the deepest parts of the ocean floor. Beside these trenches, the intense pressure and heat generated by subduction frequently lead to the formation of volcanic arcs and significant mountain ranges nearby.

259. (C) are characterized by plates sliding past one another.
Transform boundaries are distinct because the tectonic plates slide horizontally past each other without creating or destroying crust. Unlike convergent or divergent boundaries, there is generally no magma production or subduction involved. The friction between the moving plates often results in significant seismic activity and the formation of major fault lines, such as the San Andreas Fault.

260. (A) along the boundaries where tectonic plates interact.
Tectonic activity, including earthquakes and volcanic eruptions, is most concentrated at the boundaries where lithospheric plates interact. These interactions involve the release of immense energy and the movement of magma. Consequently, regions located along divergent, convergent, or transform margins experience higher frequencies of seismic and volcanic events compared to the relatively stable interiors of the tectonic plates themselves.

NODIA

261. (D) Folding of the Earth's crust
Folding is considered an endogenetic force because it originates from within the Earth's interior. These internal forces, driven by heat and pressure, are responsible for building up and deforming the crust to create large-scale relief features. In contrast, processes like erosion, weathering, and deposition are exogenetic as they are driven by external factors such as wind, water, and climate.

262. (B) wear down and reduce the elevation of landforms.
Exogenetic forces act as destructive agents that work to wear down the Earth's surface through a process known as denudation. By utilizing

energy from the sun and atmosphere, these forces, including erosion and weathering, lower the elevation of landmasses created by internal tectonic activity. Their primary role is to level the landscape and reduce the overall relief over time.

263. (C) mountain ranges and plateaus.
Diastrophism encompasses slow, large-scale movements within the Earth's crust that lead to significant deformation. This process involves the folding, faulting, and warping of rock strata, which results in the creation of prominent landforms such as mountain ranges, continents, and plateaus. It represents a major constructive force that builds the primary relief features seen on the Earth's surface today.

264. (D) Their origin, being either internal or external to the Earth.
The primary distinction between geomorphic forces lies in their point of origin relative to the Earth's surface. Endogenetic forces are generated internally by heat and pressure from within the planet, leading to crustal uplift and deformation. Exogenetic forces originate externally, primarily driven by the atmosphere and solar energy, and work to wear down the landforms through various erosional processes.

265. (A) exogenetic processes.
Denudation is a comprehensive term representing the total effect of all exogenetic processes that wear away the Earth's surface. This includes weathering, mass wasting, and erosion acting together to lower the landscape. While endogenetic forces build relief, denudation works continuously to level those features, highlighting the dynamic struggle between internal constructive forces and external destructive forces shaping the planet.

266. (B) The breakdown of rock in situ without significant movement.
Weathering is specifically defined by the disintegration or decomposition of rock in its original location, without any significant transport of the resulting fragments. This in situ breakdown differentiates it from erosion, which involves the movement of material. Weathering acts as the initial stage of denudation, weakening the rock and preparing it for eventual removal by agents like water and wind.

267. (B) chemical weathering.
Oxidation is a form of chemical weathering where minerals in rock react with oxygen, often in the presence of water. This reaction alters the chemical composition of the minerals, such as turning iron-rich minerals into iron oxide, or rust. These chemical changes weaken the rock's structure, making it more vulnerable to further breakdown and eventual removal by erosional processes.

268. (A) a preparatory stage that breaks down rock for transport.
Weathering serves as the critical first stage of the denudation process by breaking down solid bedrock into smaller, manageable fragments. By decomposing or disintegrating the rock in situ, it creates loose material that is much easier for erosional agents like gravity, water, and ice to transport. Thus, weathering effectively paves the way for the subsequent leveling of the landscape.

269. (C) A rock splitting apart due to water freezing and expanding in its cracks.
Physical weathering involves the mechanical breakdown of rock into smaller pieces without changing its chemical makeup. Frost action is a classic example, where water enters cracks in a rock and expands as it freezes, exerting pressure that eventually splits the rock apart. This process is driven by temperature fluctuations and physical stress rather than chemical reactions or mineral transformations.

270. (D) Weathering followed by erosion.
The denudation process typically begins with weathering, which weakens and breaks down rock material in its original position. Once the rock has been fragmented or decomposed, it becomes susceptible to erosion, where agents like water, wind, or ice transport the debris away. This sequential relationship ensures that the landscape is systematically worn down and leveled over geological time.

271. (C) Structure, process, and stage
W. M. Davis identified structure, process, and stage as the three fundamental factors that govern the evolution of any landscape. Structure refers to the rock's physical properties, process involves the specific erosional agents at work, and stage denotes the amount of time those processes have

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been active. Together, these elements provide a framework for predicting how landforms will change over time.

272. (B) Deep, V-shaped valleys and high relief
In the Davisian model, the youthful stage is marked by rapid vertical erosion as rivers cut deeply into the newly uplifted land. This results in the formation of steep-sided, V-shaped valleys and a landscape characterized by high relief and jagged peaks. During this early phase, the drainage system is not yet fully integrated, and the primary focus is downward cutting.

273. (D) A rapid, short-lived uplift of a landmass
According to the theory proposed by Davis, the geomorphic cycle begins with a sudden and rapid uplift of a landmass. This initial event creates the necessary potential energy for erosional agents to start working on the landscape. This period of uplift is assumed to be relatively short compared to the much longer period of stability and erosion that follows it.

274. (A) a nearly flat plain of low relief in the final stage of erosion.
A peneplain represents the theoretical end product of the Davisian cycle of erosion. It is a vast, nearly featureless plain of extremely low relief that forms after long periods of continuous denudation. At this final stage, the land has been worn down almost to sea level, and rivers flow slowly in wide, meandering paths across a mostly level surface.

275. (C) The characteristics and arrangement of the bedrock
In the context of the geomorphic cycle, structure refers to the internal characteristics of the underlying rock. This includes factors such as rock hardness, mineral composition, the presence of joints or faults, and the physical arrangement of layers. These structural properties determine how resistant a landform is to erosion and significantly influence the final shape and appearance of the landscape.

276. (A) The development of landforms is determined by the relationship between uplift and denudation rates.
Walther Penck argued that landform development is a continuous process determined by the dynamic balance between the rate of tectonic uplift and the rate of denudation. Unlike models based on fixed chronological stages, his approach emphasizes that the appearance of a slope or landscape directly reflects the relative intensity of these competing internal and external forces at any given time.

277. (D) uplift rate is greater than the rate of denudation.
In Penck's geomorphic model, 'aufsteigende Entwicklung' or waxing development occurs when the rate of internal crustal uplift exceeds the rate of external surface denudation. This imbalance leads to an increase in overall relief and the development of convex slope profiles. This phase represents a period of intensifying tectonic activity where the land is being built up faster than it erodes.

278. (B) Straight slope profiles that maintain constant relief.
Uniform development, or 'gleichförmige Entwicklung', happens when the rate of uplift and the rate of denudation are perfectly balanced. During this phase, the landscape maintains a constant relief, and the slopes typically exhibit a straight or uniform profile. These slopes tend to retreat parallel to their original positions because the opposing geomorphic forces are operating in a state of equilibrium.

279. (C) views landscape evolution as a continuous response to tectonic activity.
A fundamental distinction is that Penck viewed landscape evolution as a continuous, dynamic response to varying rates of tectonic activity rather than a series of fixed, time-dependent stages. While other models might assume long periods of stability following initial uplift, Penck's model accounts for ongoing interactions between crustal movements and erosional processes throughout the entire development of the landform.

280. (D) Absteigende Entwicklung
Concave slopes and a general reduction in landscape relief are characteristic of 'absteigende Entwicklung', also known as waning development. This phase occurs when the rate of denudation is greater than the rate of uplift, or when tectonic uplift has completely

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stopped. Over time, this leads to the formation of extensive plains and a gradual leveling of the entire topographic surface.

281. (A) Parallel retreat
The theory of parallel retreat suggests that a slope maintains its original angle and steepness as it recedes backward over time. This process is often driven by the active erosion of the slope face and the removal of debris from its base. It is a common phenomenon in arid and semi-arid regions, leading to the formation of wide pediments.

282. (B) Slope replacement
Slope replacement involves the progressive burial of a steep slope face by the accumulation of weathered debris at its base. As scree builds up, it creates a new, gentler 'debris slope' that gradually extends upward, replacing the original steeper incline. This process results in the overall profile of the landform becoming less steep from the bottom toward the top.

283. (B) W. M. Davis
The model of slope decline is most closely associated with the geomorphic theories of W. M. Davis. He proposed that through the continuous action of weathering and mass wasting, the steepest sections of a slope eventually flatten. This results in the upper part of the slope becoming progressively gentler, leading to a landscape that becomes more rounded and subdued.

284. (A) Parallel retreat in arid environments
Pediments are broad, gently sloping rock platforms that form at the base of receding mountains or hills. Their development is a characteristic feature of the parallel retreat model, especially within arid and semi-arid climates. As the main slope face maintains its angle while moving backward, the erosional process leaves behind an expansive, relatively flat plain at the foot of the landform.

285. (C) In slope decline the upper slope becomes gentler, while in parallel retreat it maintains its angle.
In the slope decline model, the upper portion of a landform is gradually rounded and becomes less steep as it erodes over time. Conversely, the parallel retreat model posits that the upper slope preserves its original steepness and angle as the entire face moves backward. This distinction highlights different ways in which weathering and erosion can reshape the crests of hills.

286. (D) mountain building through horizontal forces.
Orogenic movements are primarily horizontal crustal forces that result in intense deformation and the formation of mountain ranges. These movements apply compressional or tensional stress to rock strata, leading to significant folding and faulting. Unlike epeirogenic movements which cause broad uplift, orogeny is specifically associated with the complex structural changes that occur during the creation of massive mountain belts.

287. (C) A syncline
When horizontal compressional forces act on the Earth's crust, they can cause rock layers to bend into wave-like structures. A syncline is a specific type of fold where the rock strata dip toward a central axis, forming a valley-like down-fold. This is the opposite of an anticline, where the rocks are arched upward to form a ridge or crest.

288. (B) stresses on the crust exceed the rock's elastic limit.
Faulting occurs when the stresses acting upon the Earth's crust become so intense that they exceed the elastic limit of the rock. Instead of bending or folding, the rock fractures and undergoes displacement along a plane. This process can be triggered by either compressional or tensional forces, leading to the creation of various landforms like rift valleys and block mountains.

289. (D) A graben, or a depressed block of land.
A rift valley is a prominent geological feature formed through faulting, specifically classified as a graben. It consists of a central block of the Earth's crust that has subsided between two parallel faults. The East African Rift Valley is a well-known example of this type of depressed landform, which is often created by tensional forces pulling the crust apart.

290. (A) bending; fracturing
The fundamental distinction between these geomorphic processes lies in how rock reacts to stress. Folding involves plastic deformation or bending of rock layers without breaking,

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typically under compressional forces. Faulting is the actual fracturing or breaking of the crust followed by movement. While folding creates arches and troughs, faulting results in distinct breaks and displacements.

291. (C) Epicenter
During an earthquake, the exact location within the Earth's lithosphere where the energy is first released is known as the focus or hypocenter. The epicenter is the point on the Earth's surface situated vertically above this origin. It is typically the area that experiences the most intense ground shaking and where the greatest amount of damage to infrastructure often occurs.

292. (A) the eruption of molten rock onto the Earth's surface.
Vulcanicity encompasses all the processes associated with the movement and eruption of molten rock, or magma, from the Earth's interior onto its surface. When magma reaches the surface, it is referred to as lava. This activity can build various landforms, such as volcanoes and lava plateaus, and is a key endogenetic force that creates new relief on the Earth's crust.

293. (D) an abrupt slip of rock masses along a fault.
Earthquakes are primarily caused by the sudden and violent movement of rock masses along a fault line in the Earth's crust. This abrupt slip occurs when accumulated tectonic stress overcomes the friction holding the rocks in place. The resulting release of energy sends seismic waves through the ground, which people experience as the characteristic shaking associated with a seismic event.

294. (B) a large depression formed after a major volcanic eruption.
A caldera is a massive, bowl-shaped depression that forms on the Earth's surface following a major volcanic eruption. This feature is created when a large volume of magma is rapidly evacuated from an underground chamber, causing the overlying roof of the volcano to collapse inward. Calderas are significantly larger than volcanic craters and represent a dramatic stage in volcanic activity.

295. (C) primarily concentrated along tectonic plate boundaries.
A major observation in geology is that the vast majority of seismic and volcanic activity is not randomly distributed but is concentrated along the boundaries of tectonic plates. These margins are the sites of intense interaction, including subduction, collision, and spreading. Consequently, regions located near plate edges are much more likely to experience frequent earthquakes and active volcanic eruptions.

296. (D) Seismic activity
Seismic activity serves as a powerful trigger for multiple types of geomorphic hazards. The ground shaking produced by earthquakes can destabilize slopes, leading to the sudden downward movement of rock and soil in a landslide. Similarly, this energy release is the primary cause of earthquake hazards themselves, illustrating how a single geomorphic event can initiate different types of natural disasters simultaneously.

297. (A) Volcanoes
Pyroclastic flows are highly dangerous volcanic hazards consisting of fast-moving, extremely hot mixtures of gas, ash, and volcanic fragments. They are typically generated during explosive volcanic eruptions when an eruption column collapses or a lava dome fails. Due to their high speeds and temperatures, these flows can devastate everything in their path, making them one of the deadliest volcanic phenomena.

298. (B) Steep gradients and weak materials
The risk of landslides is highest in areas characterized by steep slopes and the presence of weak or unstable geological materials. These conditions make the landform more susceptible to failure when triggered by factors like heavy rainfall or seismic shaking. Understanding these physical characteristics is essential for identifying high-risk zones and implementing effective mitigation strategies to protect lives and property.

299. (B) The sudden release of stress along geological faults.
The primary cause of an earthquake hazard is the sudden discharge of accumulated energy or stress along a geological fault. This release occurs when the tectonic forces driving the movement of crustal plates overcome the frictional resistance of the rock. The resulting seismic waves cause

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ground shaking and surface displacement, which can lead to significant destruction of buildings and natural landscapes.

300. (A) landslides involve the movement of rock and soil, while avalanches involve the movement of snow.

Although both are forms of mass movement occurring on slopes, the fundamental difference lies in the material being transported. Landslides primarily involve the movement of terrestrial materials such as rock, soil, and debris. In contrast, avalanches are specifically characterized by the rapid downslope flow of snow and ice. Both hazards are heavily influenced by slope gradient and various environmental triggers.

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CHAPTER 02
Climatology

1. Which of the following is considered a permanent gas in the Earth's atmosphere in terms of its proportion?
(A) Ozone
(B) Nitrogen
(C) Water Vapour
(D) Carbon Dioxide

2. The layer of the atmosphere that is closest to the Earth's surface and where most weather phenomena occur is known as the:
(A) Troposphere
(B) Stratosphere
(C) Mesosphere
(D) Thermosphere

3. Read the given statements and choose the correct option.
Statement I : Temperature generally decreases with increasing altitude in the troposphere.
Statement II : The troposphere is primarily heated from below by terrestrial radiation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

4. Which one of the following is an incorrect statement regarding the composition of the atmosphere?
(A) Argon is the third most abundant gas in the atmosphere.
(B) The proportion of water vapour decreases from the equator towards the poles.
(C) Carbon dioxide is transparent to incoming solar radiation but opaque to outgoing terrestrial radiation.
(D) Ozone is most abundantly found in the troposphere, causing weather changes.

5. Match the atmospheric layers in List I with their characteristics in List II and select the correct answer using the codes given below.
List I: (Atmospheric Layer)
P. Troposphere
Q. Stratosphere
R. Mesosphere
S. Thermosphere
List II: (Characteristic)
1. Contains the ozone layer
2. Temperature decreases with height, coldest layer
3. Temperature increases with height due to absorption of UV radiation
4. Weather phenomena layer
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-4, S-3

6. The process of heat transfer through the vertical movement of air is known as:
(A) Conduction
(B) Convection
(C) Advection
(D) Radiation

7. What term is used to describe the incoming solar radiation that reaches the Earth's surface?
(A) Albedo
(B) Terrestrial Radiation
(C) Heat Budget
(D) Insolation

8. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : The amount of insolation received at the Earth's surface is less than that radiated from the sun.
Reason (R) : A part of solar radiation is absorbed, scattered, and reflected by the atmosphere.
(A) Both A and R are true and R is the correct explanation of A.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

9. The Earth's 'Heat Budget' refers to:
(A) The total amount of heat stored in the Earth's core.
(B) The process of heat transfer from the equator to the poles.
(C) The balance between incoming solar radiation and outgoing terrestrial radiation.
(D) The measurement of temperature at different latitudes.

10. Which of the following factors does NOT significantly affect the amount of insolation received at a location?
(A) The Earth's magnetic field
(B) The angle of incidence of the sun's rays
(C) The duration of daylight
(D) The transparency of the atmosphere

11. Consider the following statements about the Earth's heat budget:
1. The Earth maintains its temperature because it radiates out as much heat as it receives.
2. Albedo is the percentage of reflectivity of a surface.
3. Longwave terrestrial radiation is the primary source of atmospheric heating.
4. Clouds have no effect on the heat budget of the Earth.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 2, 3 and 4
(C) 1, 2 and 3
(D) 1 and 4 only

12. The transfer of heat through horizontal movement of air is called:
(A) Convection
(B) Advection
(C) Conduction
(D) Radiation

13. What is the most appropriate definition of 'albedo'?
(A) The specific amount of solar radiation absorbed by the Earth's surface.
(B) The total electromagnetic energy emitted by the Earth as longwave radiation.
(C) The fraction of incident radiation that is reflected by a surface.
(D) The net difference between incoming and outgoing planetary radiation.

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14. The phenomenon where temperature increases with an increase in altitude is known as:
(A) Normal lapse rate
(B) Adiabatic cooling
(C) Latent heat
(D) Temperature inversion

15. Read the given statements and choose the correct option.
Statement I : Isotherms are lines connecting points of equal atmospheric pressure.
Statement II : The horizontal distribution of temperature is commonly shown by isotherms.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

16. Which of the following factors has the most significant control over the horizontal distribution of temperature across the globe?
(A) Altitude
(B) Latitude
(C) Local winds
(D) Ocean currents

17. Match the heat transfer processes in List I with the examples in List II and select the correct answer using the codes given below.
List I: (Heat Transfer Process)
P. Radiation
Q. Conduction
R. Convection
S. Advection
List II: (Example/Medium)
1. Vertical movement of a heated air parcel
2. Heat from a hot pan to its handle
3. Horizontal movement of air in the atmosphere
4. Energy travelling from the Sun to the Earth

(A) P-1, Q-3, R-4, S-2
(B) P-4, Q-2, R-1, S-3
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-4, R-3, S-1

18. What is the primary cause of the pressure differences in the atmosphere?
(A) Differential heating of the Earth's surface
(B) The Earth's rotation
(C) The gravitational pull of the moon
(D) The presence of mountain barriers

19. The force that initiates the movement of air from a high-pressure area to a low-pressure area is the:
(A) Coriolis force
(B) Frictional force
(C) Pressure Gradient Force
(D) Gravitational force

20. Arrange the following atmospheric layers in sequence from the Earth's surface upwards:
1. Mesosphere
2. Stratosphere
3. Thermosphere
4. Troposphere

Which of the following is the correct sequential order?
(A) 4, 1, 2, 3
(B) 4, 2, 1, 3
(C) 2, 4, 1, 3
(D) 1, 2, 4, 3

21. In the Northern Hemisphere, winds are deflected to the right of their path of motion due to the:
(A) Pressure Gradient Force
(B) Centrifugal force
(C) Coriolis force
(D) Frictional force

22. Consider the following statements about winds:
1. Planetary winds blow consistently in a particular direction throughout the year.
2. Land and sea breezes are examples of periodic winds.
3. The Coriolis force is strongest at the equator and weakest at the poles.
4. An isobar is a line connecting places of equal wind speed.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 2 and 3 only
(C) 1, 2 and 4
(D) 3 and 4 only

23. Which of the following is NOT a type of planetary wind?
(A) Trade Winds
(B) Westerlies
(C) Polar Easterlies
(D) Monsoon

24. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : The Coriolis force is zero at the Equator.
Reason (R) : The speed of the Earth's rotation is maximum at the Equator.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

25. The tricellular model of atmospheric circulation consists of which of the following cells?
(A) Hadley, Ferrel, and Walker cells
(B) Walker, Polar, and Monsoon cells
(C) Hadley, Ferrel, and Polar cells
(D) Monsoon, Hadley, and Polar cells

26. A large body of air having little horizontal variation in temperature and moisture at any given level is known as a/an:
(A) Air-mass
(B) Front
(C) Jet stream
(D) Cyclone

27. The boundary zone between two different air masses is called a:
(A) Jet stream
(B) Lapse rate
(C) Tropopause
(D) Front

28. Which of the following correctly describes a cold front?
(A) A warm air mass gently glides over a cold air mass.
(B) A cold air mass actively pushes up a warm

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air mass.
(C) Two air masses of different temperatures move parallel to each other.
(D) A fast-moving warm front overtakes a cold front.

29. Which of the following statements about jet streams is incorrect?
(A) They are strong, narrow currents of air found in the upper levels of the atmosphere.
(B) They have a significant influence on weather patterns.
(C) They flow from east to west in both hemispheres.
(D) They are located near the tropopause.

30. Consider the following statements regarding the classification of air-masses:
1. 'c' denotes a continental source region, which is dry.
2. 'm' denotes a maritime source region, which is humid.
3. 'T' denotes a tropical source region, which is warm.
4. 'P' denotes a polar source region, which is warm.
5. An air mass designated 'cT' would be hot and dry.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 5
(B) 1, 2, and 4 only
(C) 3, 4, and 5 only
(D) All of the above

31. Temperate cyclones, also known as extra-tropical cyclones, are typically formed along the:
(A) Polar front
(B) Equatorial trough
(C) Subtropical high-pressure belt
(D) Inter-Tropical Convergence Zone (ITCZ)

32. The 'eye' of a tropical cyclone is a region characterized by:
(A) Extremely high winds and heavy rain
(B) Calm weather and clear skies
(C) Moderate winds and intermittent showers
(D) Intense thunderstorms and hail

33. Read the given statements and choose the correct option.
Statement I : Tropical cyclones originate only over warm ocean waters.
Statement II : The energy for tropical cyclones is derived from the latent heat of condensation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

34. An anticyclone is a weather system characterized by:
(A) A high-pressure center and anticyclonic air circulation.
(B) A low-pressure center and cyclonic air circulation.
(C) A low-pressure center and anticyclonic air circulation.
(D) A high-pressure center and cyclonic air circulation.

35. Match the circulation features in List I with their associated latitudes in List II and select the correct answer using the codes given below.
List I: (Circulation Feature)
P. Hadley Cell
Q. Ferrel Cell
R. Polar Cell
S. Jet Stream
List II: (Associated Latitude/Location)
1. Upper troposphere
2. High latitudes (60°-90°)
3. Mid-latitudes (30°-60°)
4. Low latitudes (0°-30°)
(A) P-4, Q-3, R-2, S-1
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-2, R-3, S-1
(D) P-3, Q-4, R-1, S-2

36. Which of the following is NOT a necessary condition for the formation of a tropical cyclone?
(A) A large and continuous supply of warm, moist air
(B) Strong Coriolis force
(C) A pre-existing weak low-pressure area
(D) Strong vertical wind shear

37. In Koppen's climatic classification, the letter 'A' represents which major climate type?

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(A) Dry Climates
(B) Warm Temperate Climates
(C) Tropical Moist Climates
(D) Cold Snow Forest Climates

38. According to Koppen's scheme, 'B' climates are distinguished from all other climates on the basis of:
(A) Average monthly temperature
(B) The relationship between precipitation and evaporation
(C) Amount of annual precipitation
(D) The number of months with snow cover

39. Thornthwaite's climatic classification system is primarily based on the concept of:
(A) Annual temperature and precipitation totals
(B) The dominant type of vegetation
(C) The origin of air masses
(D) Potential Evapotranspiration (PET)

40. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : In Koppen's classification, the 'E' type climates are found in the polar regions.
Reason (R) : These regions are characterized by very low temperatures throughout the year, with the warmest month average below 10°C.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

41. In Koppen's classification, what does the second letter 'f' in climates like 'Af' and 'Cf' signify?
(A) A dry summer
(B) A dry winter
(C) No distinct dry season; precipitation throughout the year
(D) A monsoon-type precipitation pattern

42. Consider the following characteristics:
1. Warmest month temperature is above 10°C.
2. Coldest month temperature is below -3°C.
3. Found in the interior of large continents in the mid-to-high latitudes.
4. Also known as Cold Snow Forest climates.

Which Koppen climate group do these characteristics best describe?
(A) D Climates
(B) C Climates
(C) E Climates
(D) B Climates

43. Which of the following statements about Thornthwaite's classification is incorrect?
(A) It uses a P/E index (Precipitation Effectiveness).
(B) It considers thermal efficiency.
(C) It uses the concept of water balance to define climatic boundaries.
(D) It is a purely empirical classification based on observed vegetation.

44. El Nino is a phenomenon characterized by the:
(A) Unusual cooling of the surface waters in the eastern tropical Pacific Ocean.
(B) Unusual warming of the surface waters in the eastern tropical Pacific Ocean.
(C) Strengthening of the westward-blowing trade winds.
(D) A positive phase of the Southern Oscillation Index (SOI).

45. The "Southern Oscillation" component of ENSO refers to:
(A) The seasonal shift of the Inter-Tropical Convergence Zone (ITCZ).
(B) The annual variation in the strength of the polar jet stream.
(C) The see-saw pattern of atmospheric pressure between the eastern and western Pacific.
(D) The decadal cycle of sunspot activity affecting Earth's climate.

46. Which of the following is a typical consequence of a strong La Nina event?
(A) Drought conditions in Australia and Indonesia.
(B) Weaker trade winds across the Pacific.
(C) Warmer than average sea surface temperatures off the coast of Peru.
(D) Heavier than average rainfall in Australia and Indonesia.

47. Consider the following events in the formation of a temperate cyclone:
1. Occlusion of the front occurs.
2. A stationary front develops between two contrasting air masses.

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3. A wave-like disturbance forms on the front.
4. The cyclone dissipates.
5. The cold front moves faster than the warm front, creating distinct sectors.

Which of the following is the correct sequential order?
(A) 2, 3, 5, 1, 4
(B) 3, 2, 5, 4, 1
(C) 2, 5, 3, 1, 4
(D) 1, 2, 3, 4, 5

48. Read the given statements and choose the correct option.
Statement I : During an El Nino event, the Walker Circulation weakens or reverses.
Statement II : La Nina represents an intensification of the normal conditions in the Pacific Ocean.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

49. Which of the following meteorological hazards is characterized by a violently rotating column of air that is in contact with both the Earth's surface and a cumulonimbus cloud?
(A) Cyclone
(B) Tornado
(C) Hailstorm
(D) Cloudburst

50. A prolonged period of abnormally low rainfall, leading to a shortage of water, is known as a:
(A) Drought
(B) Cloudburst
(C) Cold wave
(D) Flood

51. Consider the following statements about meteorological hazards:
1. Thunderstorms are associated with cumulonimbus clouds.
2. A heat wave is defined by a consistent standard temperature threshold worldwide.
3. Hailstorms are formed within thunderstorms with strong updrafts.
4. Cloudbursts are characterized by unexpectedly heavy rainfall in a short period over a small area.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 3
(B) 1, 3 and 4
(C) 2 and 4 only
(D) All of the above

52. Glacial Lake Outburst Flood (GLOF) is a hazard primarily associated with:
(A) Coastal regions experiencing storm surges.
(B) River valleys in arid regions.
(C) Tectonically active zones prone to tsunamis.
(D) High-mountain environments with retreating glaciers.

53. Which of the following is NOT considered a direct human impact on global climate?
(A) Burning of fossil fuels
(B) Deforestation
(C) Milankovitch cycles
(D) Industrial emissions

54. The increase in the concentration of greenhouse gases in the atmosphere is a primary cause of:
(A) Ozone layer depletion
(B) Global warming
(C) Acid rain
(D) The formation of polar stratospheric clouds

55. Which of the following is a key piece of evidence for climate change in the past?
(A) Daily weather forecast records from the last 50 years.
(B) Fluctuations in the stock market.
(C) Changes in political boundaries.
(D) Analysis of ice cores from Antarctica and Greenland.

56. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Deforestation contributes to an increase in atmospheric carbon dioxide.
Reason (R) : Trees absorb carbon dioxide from the atmosphere through the process of photosynthesis.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

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(C) A is true but R is false.
(D) A is false but R is true.

57. The tropopause is best described as:
(A) The lowest part of the troposphere.
(B) A layer within the stratosphere where temperature is constant.
(C) The boundary between the troposphere and the stratosphere.
(D) The region where all clouds are formed.

58. What is the approximate percentage of oxygen in the Earth's atmosphere by volume?
(A) 21%
(B) 78%
(C) 1%
(D) 0.04%

59. Read the given statements and choose the correct option.
Statement I : The Mesosphere is the coldest layer of the atmosphere.
Statement II : The Thermosphere is characterized by very high temperatures but an object there would feel cold because of the low density of particles.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

60. The process by which the Earth's atmosphere traps some of the Sun's energy, warming the Earth, is known as:
(A) The Albedo effect
(B) The Greenhouse effect
(C) The Coriolis effect
(D) The Adiabatic effect

61. Match the gases in List I with their roles in List II and select the correct answer using the codes given below.
List I: (Gas)
P. Nitrogen
Q. Oxygen
R. Carbon Dioxide
S. Ozone

List II: (Role/Characteristic)
1. Absorbs ultraviolet radiation
2. Essential for respiration
3. Key greenhouse gas
4. Most abundant gas
(A) P-4, Q-2, R-3, S-1
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-3, R-1, S-2
(D) P-2, Q-4, R-1, S-3

62. A "cold wave" is a meteorological event characterized by:
(A) A prolonged period of excessively hot weather.
(B) Heavy snowfall accompanied by strong winds.
(C) The formation of dense fog in winter.
(D) A rapid drop in temperature within 24 hours.

63. The primary reason for temperature inversion is:
(A) Radiational cooling of the ground at night
(B) Rapid convection during the day
(C) Strong winds mixing the air layers
(D) Heavy rainfall cooling the surface

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64. Consider the following statements about the general circulation of the atmosphere:
1. The Hadley cell involves rising air at the equator and sinking air in the subtropics.
2. The Westerlies are surface winds that flow from the subtropical highs towards the subpolar lows.
3. The Polar cell is a thermally direct cell driven by cold temperatures at the poles.
4. The Ferrel cell is a thermally indirect cell, driven by the motion of the adjacent cells.
5. The ITCZ is a zone of high pressure and subsiding air.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 5 only
(B) 1, 2, 3, and 4
(C) 3, 4, and 5 only
(D) 2 and 5 only

65. Lines drawn on a map connecting points of equal atmospheric pressure are called:
(A) Isotherms
(B) Isobars
(C) Isohyets

(D) Contours

66. What type of front is formed when a cold front overtakes a warm front, lifting the warm air mass completely off the ground?
(A) Occluded Front
(B) Stationary Front
(C) Warm Front
(D) Polar Front

67. Which of the following is considered a 'variable' gas in the atmosphere?
(A) Argon
(B) Nitrogen
(C) Water Vapour
(D) Oxygen

68. The "normal lapse rate" in the troposphere is the average rate at which:
(A) Temperature increases with altitude.
(B) Pressure decreases with altitude.
(C) Air density increases with altitude.
(D) Temperature decreases with altitude.

69. Read the given statements and choose the correct option.
Statement I : The heat budget of the Earth is perfectly balanced at every latitude.
Statement II : There is a net surplus of radiation in the tropics and a net deficit at the poles.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

70. Which of the following surfaces would likely have the highest albedo?
(A) A dense forest
(B) A freshly fallen snowfield
(C) A dark asphalt road
(D) An ocean surface

71. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Temperate cyclones are generally larger in area than tropical cyclones.
Reason (R) : Temperate cyclones form over both land and sea, while tropical cyclones form only over warm oceans.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

72. In the context of atmospheric pressure, what causes air to subside or sink?
(A) Upper-air convergence
(B) Surface heating and convection
(C) Surface convergence
(D) Frontal lifting

73. The air mass designated as 'mP' would be characterized as:
(A) Warm and dry
(B) Cold and dry
(C) Cold and moist
(D) Warm and moist

74. Consider the following statements about cyclones and anticyclones in the Northern Hemisphere:
1. Winds in a cyclone blow counter-clockwise and inwards.
2. Winds in an anticyclone blow clockwise and outwards.
3. Cyclones are associated with rising air and cloudy weather.
4. Anticyclones are associated with sinking air and clear skies.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2, and 3
(D) 1, 2, 3, and 4

75. Arrange the following gases in decreasing order of their percentage in the atmosphere:
1. Oxygen
2. Carbon Dioxide
3. Nitrogen
4. Argon

Which of the following is the correct sequential order?
(A) 3, 1, 4, 2
(B) 1, 3, 4, 2
(C) 3, 1, 2, 4

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(D) 1, 3, 2, 4

76. The Southern Oscillation Index (SOI) is calculated based on the pressure difference between which two locations?
(A) Hawaii and Peru
(B) Tahiti and Darwin
(C) New Delhi and Beijing
(D) London and New York

77. In Koppen's classification, a climate designated as 'Cs' would have:
(A) A dry winter
(B) No dry season
(C) A dry summer
(D) A monsoon season

78. The primary cause of past ice ages, according to the Milankovitch theory, is:
(A) Massive volcanic eruptions blocking sunlight.
(B) A decrease in the Sun's energy output.
(C) The continental drift changing ocean currents.
(D) Variations in the Earth's orbit and axial tilt.

79. A weather forecaster observes a rapid fall in barometric pressure, the formation of large cumulonimbus clouds, and increasing wind speed. This pattern is most indicative of the approach of a:
(A) Cold front
(B) High-pressure system
(C) Period of stable weather
(D) Temperature inversion

80. What is the most significant role of the ozone layer in the stratosphere?
(A) It causes temperature to decrease with height.
(B) It absorbs harmful ultraviolet (UV) radiation from the sun.
(C) It is the source of all weather phenomena.
(D) It traps terrestrial radiation, warming the planet.

81. Match the hazards in List I with their primary characteristics in List II and select the correct answer using the codes given below.
List I: (Hazard)
P. Cyclone
Q. Drought
R. GLOF
S. Heat Wave
List II: (Primary Characteristic)
1. Sudden release of water from a moraine-dammed lake
2. Prolonged period of abnormally high temperatures
3. Intense low-pressure system with strong rotating winds
4. Severe water scarcity due to deficit rainfall
(A) P-4, Q-2, R-3, S-1
(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-1, S-3

82. Which of the following is NOT an example of a local wind?
(A) Westerlies
(B) Loo
(C) Fohn
(D) Chinook

83. The Inter-Tropical Convergence Zone (ITCZ) is a low-pressure belt characterized by:
(A) Sinking, dry air
(B) Strong westerly winds
(C) Converging trade winds and convection
(D) The formation of polar fronts

84. Read the given statements and choose the correct option.
Statement I : Anticyclones are typically associated with fair weather conditions.
Statement II : The subsiding air in an anticyclone warms adiabatically and becomes drier, inhibiting cloud formation.
(A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

85. Which of the following is a direct consequence of the differential heating of land and water?
(A) The formation of jet streams

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(B) The Coriolis effect
(C) The development of land and sea breezes
(D) The existence of the ozone layer

86. A "stationary front" occurs when:
(A) A cold front rapidly overtakes a warm front.
(B) Two air masses are in contact but neither is advancing.
(C) A warm front rapidly overtakes a cold front.
(D) The front dissipates completely.

87. Which of the following statements about temperature is correct?
(A) Temperature range is greater over oceans than over continents.
(B) Coastal areas have a higher annual range of temperature than continental interiors.
(C) The daily range of temperature is highest in cloudy, humid areas.
(D) The annual range of temperature is highest in the continental interiors of mid-latitudes.

88. The horse latitudes are associated with which pressure belt?
(A) Subtropical High
(B) Equatorial Low
(C) Subpolar Low
(D) Polar High

89. Consider the following as potential causes of climate change:
1. Changes in Earth's orbit (Milankovitch Cycles).
2. Increased concentration of greenhouse gases from industry.
3. Large-scale deforestation.
4. Major volcanic eruptions.
5. Changes in land use, such as urbanization.

Which of the above statement(s) is/are considered anthropogenic (human-induced)?
(A) 1, 2 and 4
(B) 2, 3 and 5
(C) 1, 4 and 5
(D) 2, 3 and 4

90. The term 'Southern Oscillation' is most directly linked to which of the following phenomena?
(A) Pressure changes between the eastern and western Pacific
(B) The strength of the Indian Monsoon
(C) The formation of temperate cyclones
(D) The annual cycle of seasons

91. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : The western coasts of continents in the subtropics are often characterized by deserts.
Reason (R) : These regions are dominated by the subsiding air of the subtropical high-pressure cells and are often bordered by cold ocean currents.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

92. What does the term "terrestrial radiation" refer to?
(A) The solar energy received by the Earth.
(B) The longwave radiation emitted by the Earth's surface.
(C) The reflection of sunlight from clouds.
(D) The energy radiated by the Sun's core.

93. Which atmospheric layer contains electrically charged particles known as ions and is crucial for radio communication?
(A) Troposphere
(B) Stratosphere
(C) Thermosphere (Ionosphere)
(D) Mesosphere

94. The trade winds in the Northern Hemisphere blow from which general direction?
(A) Southwest to Northeast
(B) Northwest to Southeast
(C) Southeast to Northwest
(D) Northeast to Southwest

95. In Thornthwaite's 1948 classification, the moisture index is used to determine:
(A) The aridity or humidity of a region based on water balance.
(B) The level of thermal efficiency.
(C) The potential for agricultural productivity.
(D) The seasonal concentration of precipitation.

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96. Which of the following is the most intense and destructive meteorological phenomenon in terms of wind speed over a small area?
(A) Tropical Cyclone
(B) Tornado
(C) Temperate Cyclone
(D) Thunderstorm

97. Read the given statements and choose the correct option.
Statement I : A GLOF can result in catastrophic downstream flooding.
Statement II : The failure of a moraine dam, which holds a glacial lake, can be triggered by earthquakes or excessive water pressure.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

98. The primary basis for the first letter (A, C, D, E) in Koppen's classification is:
(A) Temperature
(B) Precipitation
(C) Vegetation
(D) Evaporation

99. Which of the following phenomena is NOT directly associated with a thunderstorm?
(A) Lightning
(B) Heavy rain or hail
(C) Persistent, calm, clear skies
(D) Strong winds

100. The boundary where a warm air mass is advancing and rising over a retreating colder air mass is known as a:
(A) Cold Front
(B) Occluded Front
(C) Stationary Front
(D) Warm Front

101. Consider the following characteristics:
1. Originates exclusively over warm tropical oceans.
2. Requires a sea surface temperature of at least 26.5°C.
3. Does not form at the equator due to negligible Coriolis force.
4. Characterized by a well-defined 'eye' at its center.

Which phenomenon is being described?
(A) Temperate Cyclone
(B) Tropical Cyclone
(C) Tornado
(D) Anticyclone

102. Which of the following is a correct statement about upper air circulation?
(A) The polar front jet stream is located over the sub-polar low-pressure belt.
(B) Jet streams are surface-level winds.
(C) The flow of jet streams is typically uniform and non-meandering.
(D) Jet streams flow from east to west in the mid-latitudes.

103. Match the Koppen codes in List I with their climate descriptions in List II and select the correct answer using the codes given below.
List I: (Koppen Code)
P. Af
Q. BWh
R. Csa
S. ET
List II: (Climate Description)
1. Mediterranean (Dry Summer)
2. Tropical Rainforest
3. Tundra
4. Hot Desert
(A) P-2, Q-4, R-1, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-3, R-4, S-1
(D) P-4, Q-1, R-2, S-3

104. "Latent heat of condensation" is a critical energy source for which of the following?
(A) Land and sea breezes
(B) Temperature inversions
(C) Formation of fog
(D) Tropical cyclones

105. Arrange the following events of the El Nino phase in a logical sequence:
1. The thermocline deepens in the eastern Pacific.
2. Trade winds weaken or reverse.
3. Warm surface water moves from the western

NODIA

Pacific to the eastern Pacific.
4. Upwelling of cold, nutrient-rich water ceases off the coast of Peru.

Which of the following is the correct sequential order?
(A) 2, 3, 1, 4
(B) 1, 2, 3, 4
(C) 2, 1, 4, 3
(D) 4, 3, 2, 1

106. A person living in a city on the east coast of a continent at 45°N latitude is most likely to experience a climate influenced by:
(A) Cold ocean currents, leading to aridity.
(B) The subsidence of the subtropical high all year round.
(C) The polar easterlies, bringing frigid air.
(D) Warm ocean currents, leading to milder and wetter conditions.

107. The transition from a La Nina phase to an El Nino phase involves which of the following changes?
(A) Warming of the central and eastern tropical Pacific.
(B) A strengthening of the Walker Circulation.
(C) A rise in the Southern Oscillation Index (SOI).
(D) An increase in upwelling along the Peruvian coast.

108. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Cloudbursts are extremely high-intensity rainfall events.
Reason (R) : They often occur in hilly areas where orographic lift can cause rapid condensation in a localized stationary cloud.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

109. Which of the following is NOT a primary greenhouse gas?
(A) Carbon Dioxide (CO_2)
(B) Oxygen (O_2)
(C) Methane (CH_4)
(D) Nitrous Oxide (N_2O)

110. Which statement best describes the Ferrel Cell in the tricellular model?
(A) It is a thermally direct cell driven by solar radiation at the equator.
(B) It is a thermally indirect cell, acting like a gear between the Hadley and Polar cells.
(C) It is a thermally direct cell driven by cold air at the poles.
(D) It is located between 60 degrees and 90 degrees latitude.

111. Consider the following statements about atmospheric stability:
1. An unstable atmosphere encourages vertical air movement and convection.
2. A stable atmosphere resists vertical movement.
3. A temperature inversion is an extremely stable condition.
4. Stability is determined by comparing the environmental lapse rate to the adiabatic lapse rate of a rising air parcel.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 3
(D) 1, 2, 3, and 4

112. The term for the sudden, rapid and extreme fall in air temperature in a short period of time is:
(A) Heat wave
(B) Cold wave
(C) Temperature inversion
(D) Cloudburst

113. An air mass originating over Siberia in winter would be classified as:
(A) mP (maritime Polar)
(B) cT (continental Tropical)
(C) cP (continental Polar)
(D) mT (maritime Tropical)

114. The horizontal distribution of temperature is most effectively represented on a map by:
(A) Isobars
(B) Isotherms
(C) Isohyets
(D) Isonifs

115. Read the given statements and choose the correct option.

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Statement I : The Coriolis force determines the initial direction of wind movement.
Statement II : The Pressure Gradient Force is responsible for the deflection of wind.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

116. In Koppen's climatic classification, what does the letter 'D' represent?
(A) Polar Climates
(B) Dry Climates
(C) Cold Snow Forest Climates
(D) Warm Temperate Rainy Climates

117. Which of the following is an example of human impact on global climate?
(A) The Milankovitch cycle of orbital variations.
(B) The release of aerosols from volcanic eruptions.
(C) The increase of methane from agriculture and landfills.
(D) The natural cycle of El Nino and La Nina.

118. A hailstone is formed through which process?
(A) The freezing of raindrops as they fall through a cold layer of air.
(B) The accumulation of supercooled water droplets on an ice particle within a strong thunderstorm updraft.
(C) The direct condensation of water vapor into ice crystals at ground level.
(D) The breakup of large ice sheets in the upper atmosphere.

119. Which of the following is NOT an evidence of past climate change?
(A) Analysis of pollen in lake sediments
(B) Study of tree ring thickness
(C) Examination of ice core gas bubbles
(D) Daily temperature readings from the last five years

120. Match the terms in List I with their associations in List II and select the correct answer using the codes given below.

List I: (Term)
P. Isobar
Q. Isotherm
R. ITCZ
S. Albedo

List II: (Definition/Association)
1. Line of equal temperature
2. Equatorial low-pressure trough
3. Reflectivity of a surface
4. Line of equal pressure

(A) P-1, Q-4, R-3, S-2
(B) P-4, Q-1, R-2, S-3
(C) P-4, Q-2, R-1, S-3
(D) P-1, Q-3, R-2, S-4

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121. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Tropical cyclones do not form at the equator.
Reason (R) : The Coriolis force, which is essential for providing the necessary spin, is zero at the equator.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

122. The Doldrums are an equatorial oceanic region known for:
(A) Strong, steady trade winds.
(B) Calm or very light and variable winds.
(C) Frequent temperate cyclones.
(D) Extremely cold temperatures and icebergs.

123. The "normal" atmospheric circulation in the tropical Pacific, which is disrupted during El Nino, is known as the:
(A) Ferrel Circulation
(B) Polar Circulation
(C) Walker Circulation
(D) Hadley Circulation

124. Which of the following statements about an occluded front is most accurate?
(A) It involves only two air masses, one warm and one cold.
(B) It forms when a cold front catches up with and overtakes a warm front.
(C) It results in long periods of clear, stable

weather.
(D) It is a boundary where two air masses are not moving.

125. Consider the following statements about the structure of the atmosphere:
1. The troposphere is thickest at the poles and thinnest at the equator.
2. The ozone layer is located in the stratosphere.
3. Meteors burn up in the mesosphere.
4. The thermosphere is the hottest layer of the atmosphere.
5. Most weather events are confined to the troposphere.

Which of the above statement(s) is/are correct?
(A) 2, 3, 4, and 5
(B) 1, 2, and 3 only
(C) 1, 4, and 5 only
(D) All of the above

126. What is a key difference between tropical and temperate cyclones?
(A) Tropical cyclones have a clear frontal system, while temperate cyclones do not.
(B) Tropical cyclones are driven by latent heat, while temperate cyclones are driven by the temperature contrast between air masses.
(C) Temperate cyclones form over warm oceans, while tropical cyclones form over land.
(D) Temperate cyclones are smaller and more intense than tropical cyclones.

127. Which layer of the atmosphere is characterized by a steady increase in temperature with altitude due to the absorption of UV radiation by ozone?
(A) Troposphere
(B) Stratosphere
(C) Mesosphere
(D) Thermosphere

128. In the context of atmospheric science, what does 'advection' mean?
(A) The horizontal transfer of heat or other atmospheric properties.
(B) The vertical transfer of heat.
(C) The process of water changing from vapor to liquid.
(D) The reflection of solar energy.

129. Read the given statements and choose the correct option.

Statement I : In a La Nina phase, trade winds in the Pacific are stronger than normal.
Statement II : A strong La Nina can lead to drought conditions in Peru and Chile.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

NODIA

130. A GLOF (Glacial Lake Outburst Flood) is a specific type of:
(A) Flash flood originating from a glacial lake.
(B) Slow-moving flood caused by snowmelt.
(C) Coastal flood caused by a tsunami.
(D) River flood caused by monsoon rains.

131. Arrange the stages of a thunderstorm's life cycle in the correct chronological order:
1. Mature Stage
2. Dissipating Stage
3. Cumulus Stage

Which of the following is the correct sequential order?
(A) 1, 2, 3
(B) 3, 2, 1
(C) 3, 1, 2
(D) 2, 3, 1

132. The concept of Potential Evapotranspiration (PET) is central to the climatic classification system developed by:
(A) Koppen
(B) Trewartha
(C) Thornthwaite
(D) Strahler

133. Which of the following is a primary characteristic of an anticyclone?
(A) Inward spiraling air
(B) Low central pressure
(C) Divergence of air at the surface
(D) Association with stormy weather

134. Which of the following statements about the heat budget of the Earth is incorrect?
(A) The Earth as a whole maintains a balance between incoming and outgoing energy.

(B) There is a surplus of energy in tropical regions.
(C) There is a deficit of energy in polar regions.
(D) Heat transfer from low to high latitudes occurs solely through ocean currents.

135. In Koppen's climate classification, a 'B' climate is defined primarily by:
(A) The coldest month's temperature being below 18°C.
(B) Precipitation being less than potential evapotranspiration.
(C) The warmest month's temperature being above 10°C.
(D) Having precipitation in all seasons.

136. Consider the following statements about fronts:
1. Cold fronts often bring short, intense precipitation and thunderstorms.
2. Warm fronts typically have a gentle slope and produce widespread, light-to-moderate precipitation.
3. An occluded front marks the most mature stage of a mid-latitude cyclone.
4. The weather clears rapidly after the passage of a warm front.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) All of the above

137. The 'Roaring Forties', 'Furious Fifties', and 'Shrieking Sixties' are terms used to describe strong westerly winds found in:
(A) The Northern Atlantic Ocean
(B) The Southern Hemisphere
(C) The Arctic Circle
(D) The Mediterranean Sea

138. The primary driver of the tricellular model of atmospheric circulation is:
(A) The temperature difference between land and sea.
(B) The unequal distribution of solar radiation between the equator and the poles.
(C) The Earth's magnetic field.
(D) The gravitational pull of the moon.

139. A pilot flying from west to east at a high altitude would likely seek out which phenomenon to increase ground speed and save fuel?
(A) A surface trade wind
(B) A jet stream
(C) An area of temperature inversion
(D) A stationary front

140. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Urban areas often experience higher temperatures than surrounding rural areas, a phenomenon known as the urban heat island effect.
Reason (R) : Urban surfaces like asphalt and concrete have lower albedo and greater thermal capacity than natural vegetation.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

141. Match the local winds in List I with their regions in List II and select the correct answer using the codes given below.
List I: (Local Wind)
P. Fohn
Q. Loo
R. Chinook
S. Mistral
List II: (Region)
1. Northern plains of India
2. Alps (leeward side)
3. Rocky Mountains (leeward side)
4. Rhone Valley (France)
(A) P-2, Q-1, R-3, S-4
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-3, R-4, S-1
(D) P-4, Q-1, R-2, S-3

142. The main cause of the deflection of ocean currents and winds is the:
(A) Pressure gradient
(B) Earth's rotation
(C) Gravitational force
(D) Temperature difference

143. Which of these is NOT a direct cause of past climate change?

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(A) Volcanic activity
(B) Changes in solar output
(C) Anthropogenic greenhouse gas emissions
(D) Variations in Earth's orbit

144. Which of the following is the best description of a 'cloudburst'?
(A) A very sudden and heavy downpour of rain, often in a mountainous area.
(B) A long spell of light drizzle.
(C) The formation of clouds at high altitudes.
(D) The dissipation of a cloud due to strong winds.

145. Read the given statements and choose the correct option.
Statement I : The concentration of atmospheric carbon dioxide has been steadily increasing since the Industrial Revolution.
Statement II : The primary source of this increase is the burning of fossil fuels and deforestation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

146. A city located on a coast experiences a sea breeze during the day because:
(A) The sea cools down faster than the land.
(B) The land heats up faster than the sea, creating a local low pressure over land.
(C) The Coriolis force is stronger during the day.
(D) The prevailing winds blow from sea to land.

147. What is the fundamental basis for the classification of air masses?
(A) Their wind speed and direction.
(B) Their altitude and pressure.
(C) Their source region's temperature and moisture characteristics.
(D) The type of clouds they contain.

148. Which of the following is a key feature of a temperate cyclone life cycle?
(A) An eye wall
(B) Occlusion
(C) Formation over water warmer than 27°C
(D) Absence of fronts

149. Consider the following statements regarding meteorological hazards:
1. Tornadoes are measured on the Fujita scale.
2. Cyclones in the Atlantic are called hurricanes.
3. Cold waves are exclusively a high-latitude phenomenon.
4. Hailstorms require strong updrafts in cumulonimbus clouds.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 1 and 3 only
(C) 2 and 4 only
(D) All of the above

150. Human impact on global climate is primarily studied through its effect on:
(A) The Earth's orbit
(B) The global energy balance
(C) The movement of tectonic plates
(D) Sunspot cycles

NODIA

151. Which Koppen climate type is characterized by the code 'Am'?
(A) Tropical Rainforest
(B) Tropical Monsoon
(C) Tropical Savanna
(D) Hot Desert

152. In the context of the global heat budget, what is the role of atmospheric and oceanic circulation?
(A) To generate more heat for the planet.
(B) To transfer surplus heat from the tropics to the poles.
(C) To increase the Earth's overall albedo.
(D) To create a net radiation imbalance.

153. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : The stratosphere is a very stable atmospheric layer with minimal vertical mixing.
Reason (R) : Temperature in the stratosphere increases with altitude, which inhibits convection.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.
(D) A is false but R is true.

154. What is the defining characteristic of a 'drought'?
(A) A single day without rain.
(B) A seasonal lack of rain that is expected.
(C) A prolonged period with a significant deficit in water supply.
(D) Temperatures consistently above 40°C.

155. Which of the following statements about the composition of the atmosphere is correct?
(A) The percentage of nitrogen is higher in the upper atmosphere.
(B) The proportions of permanent gases like nitrogen and oxygen remain remarkably constant up to about 90 km.
(C) Water vapor is evenly distributed throughout the atmosphere.
(D) Ozone is a permanent and non-variable gas.

156. Consider the following steps in the formation of a GLOF:
1. The moraine dam fails.
2. A glacial lake forms and grows, contained by a moraine.
3. A catastrophic flood occurs downstream.
4. A trigger event (e.g., earthquake, avalanche) destabilizes the dam.

Which of the following is the correct sequential order?
(A) 2, 4, 1, 3
(B) 1, 2, 3, 4
(C) 2, 1, 4, 3
(D) 4, 2, 1, 3

157. The "Walker Circulation" is directly associated with which of the following phenomena?
(A) The Indian Monsoon
(B) The ENSO cycle
(C) The formation of polar fronts
(D) The North Atlantic Oscillation

158. Which of the following conditions would be most conducive to the formation of a temperature inversion on a clear night?
(A) Strong winds and cloudy skies
(B) Calm winds and clear skies
(C) Strong winds and clear skies
(D) Calm winds and cloudy skies

159. Consider the following statements about climate classification:
1. Koppen's classification is empirical, based on temperature and precipitation data.
2. Thornthwaite's classification is genetic, focusing on the causes of climate.
3. Koppen's 'B' climates are defined by temperature thresholds.
4. Thornthwaite's system uses potential evapotranspiration as a key variable.
5. Both systems are widely used in geography and climatology.

Which of the above statement(s) is/are correct?
(A) 1, 4, and 5
(B) 2, 3, and 5
(C) 1, 2, and 4
(D) 3 and 4 only

160. Match the circulation cells in List I with their surface winds in List II and select the correct answer using the codes given below.
List I: (Circulation Cell)
P. Hadley Cell
Q. Ferrel Cell
R. Polar Cell
List II: (Surface Winds)
1. Westerlies
2. Polar Easterlies
3. Trade Winds
(A) P-3, Q-1, R-2
(B) P-1, Q-2, R-3
(C) P-3, Q-2, R-1
(D) P-2, Q-1, R-3

161. A 'heat wave' is officially declared based on:
(A) A single day of high temperature.
(B) The temperature exceeding locally-defined thresholds for a certain number of consecutive days.
(C) The temperature exceeding a fixed global standard of 40°C.
(D) A high "feels like" temperature, regardless of the actual air temperature.

162. Read the given statements and choose the correct option.
Statement I : Air pressure decreases with increasing altitude.
Statement II : The density of air is greatest near the Earth's surface due to gravity.
(A) Both Statement I and Statement II are

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correct, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

163. The Milankovitch cycles, which are a potential cause of long-term climate change, do NOT include:
(A) Changes in the eccentricity of Earth's orbit.
(B) Changes in the tilt of Earth's axis (obliquity).
(C) The precession (wobble) of Earth's axis.
(D) Changes in the Sun's energy output (solar cycles).

164. Which atmospheric force is responsible for causing moving air to change direction rather than speed?
(A) Pressure Gradient Force
(B) Frictional Force
(C) Coriolis Force
(D) Gravitational Force

165. The life cycle of a mid-latitude cyclone, from formation to dissipation, is best described by the:
(A) Walker Circulation Model
(B) Polar Front Theory
(C) Tricellular Model
(D) ENSO Cycle

166. Which one of the following statements about El Nino is incorrect?
(A) It involves the warming of sea surface temperatures in the eastern Pacific.
(B) It leads to a weakening of the Pacific trade winds.
(C) It causes increased upwelling of cold water off the coast of Peru.
(D) It is associated with a negative value of the Southern Oscillation Index.

167. In Koppen's classification, what does the third letter 'a' in a 'Cfa' climate signify?
(A) Dry summer
(B) Hot summer
(C) Cold winter
(D) No dry season

168. Consider the following statements about characteristics of a cold front passage:
1. A sharp drop in temperature.
2. A shift in wind direction.
3. A narrow band of heavy precipitation and thunderstorms.
4. A rapid increase in atmospheric pressure after the front passes.

Which of the above statement(s) is/are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2, and 3 only
(D) 1, 2, 3, and 4

169. What is the primary source of energy for the Earth's atmosphere and its circulation?
(A) Geothermal heat from the Earth's core
(B) Solar radiation
(C) Tidal forces from the Moon
(D) Latent heat released during earthquakes

NODIA

170. Which of the following best explains why highland climates are distinct and often variable over short distances?
(A) The uniform effect of latitude is dominant.
(B) The rapid change in altitude, aspect, and slope creates a mosaic of microclimates.
(C) They are exclusively found in tropical regions.
(D) They are always drier than surrounding lowlands.

171. A family is planning a trip and wants to visit a region with a 'Mediterranean Climate' (Cs). They should expect to find:
(A) Heavy rain throughout the summer.
(B) Warm, dry summers and mild, wet winters.
(C) Cold, snowy winters and hot, humid summers.
(D) Consistent, moderate temperature and rainfall all year.

172. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : La Nina represents an enhancement of the normal atmospheric and oceanic conditions in the Pacific.
Reason (R) : During La Nina, the trade winds are stronger, and the upwelling of cold water

along the eastern Pacific is more intense.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

173. The boundary separating the polar cell and the Ferrel cell is known as the:
(A) Inter-Tropical Convergence Zone (ITCZ)
(B) Subtropical Jet Stream
(C) Polar Front
(D) Horse Latitudes

174. Which of the following is NOT a consequence of a strong El Nino event?
(A) Drought in Indonesia and Australia
(B) Increased rainfall and flooding in Peru and Ecuador
(C) Weakening of the Indian Monsoon
(D) Strengthening of the Pacific trade winds

175. Match the Koppen climate types in List I with their defining characteristics in List II and select the correct answer using the codes given below.
List I: (Main Climate Type)
P. A
Q. B
R. C
S. D
List II: (Defining Characteristic)
1. Aridity is the key feature
2. Mild winters, warm temperate
3. Severe winters, cold snow forest
4. Winterless, tropical
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-2, S-3
(C) P-4, Q-2, R-3, S-1
(D) P-3, Q-1, R-4, S-2

176. Which process is responsible for the formation of dew on a cool, clear night?
(A) Evaporation
(B) Condensation
(C) Sublimation
(D) Precipitation

177. Read the given statements and choose the correct option.
Statement I : An anticyclone is a system of high atmospheric pressure.
Statement II : In the Northern Hemisphere, winds in an anticyclone circulate in a counter-clockwise direction.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

178. What term describes the condition when air contains the maximum amount of water vapor it can hold at a specific temperature?
(A) Supersaturation
(B) Saturation
(C) Dew Point
(D) Relative Humidity

179. The most significant anthropogenic factor contributing to global climate change is:
(A) The release of chlorofluorocarbons (CFCs).
(B) The emission of carbon dioxide from burning fossil fuels.
(C) The generation of urban heat islands.
(D) The construction of large water reservoirs.

180. Consider the following statements related to the ENSO cycle:
1. El Nino is the warm phase of ENSO.
2. La Nina is the cold phase of ENSO.
3. The Southern Oscillation refers to pressure changes between the eastern and western tropical Pacific.
4. El Nino and La Nina are purely atmospheric phenomena with no oceanic component.
5. The normal condition in the Pacific is a strong Walker Circulation.
Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 5
(B) 1, 2, and 4 only
(C) 3, 4, and 5 only
(D) All of the above

181. A 'Tornado Watch' issued by a meteorological agency means that:
(A) A tornado has been spotted and is currently causing damage.
(B) Conditions are favorable for the formation

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of tornadoes in the area.
(C) A tornado has just dissipated, but caution is still advised.
(D) Tornadoes are expected to form within the next 48 hours.

182. Which of the following air masses would be the warmest and most humid?
(A) cP (continental Polar)
(B) mP (maritime Polar)
(C) cT (continental Tropical)
(D) mT (maritime Tropical)

183. The Earth's heat budget shows a net radiation surplus in the tropics and a deficit in the polar regions. This imbalance is corrected primarily by:
(A) The greenhouse effect
(B) The Earth's albedo
(C) Heat transfer via atmosphere and oceans
(D) The changing of seasons

184. In Koppen's classification scheme, the Tundra climate is represented by the symbol:
(A) EF
(B) Dfd
(C) ET
(D) Cwc

185. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Mountains and highlands have complex and varied climates.
Reason (R) : Altitude, slope, and aspect are major controlling factors of climate in mountainous regions.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

186. Which factor is most responsible for the existence of the stratosphere's temperature profile, where temperature increases with height?
(A) The presence of water vapor
(B) The absorption of solar UV radiation by ozone
(C) The distance from the Earth's surface
(D) The convection of heat from the troposphere

187. "Frontolysis" is the term for the:
(A) Formation of a new front.
(B) Intensification of an existing front.
(C) Dissipation or weakening of a front.
(D) The process of frontal occlusion.

188. Which of the following is NOT a meteorological hazard?
(A) Hailstorm
(B) Earthquake
(C) Heat wave
(D) Tornado

189. Read the given statements and choose the correct option.
Statement I : The Pressure Gradient Force (PGF) is the primary force that causes wind.
Statement II : The PGF is directed from high pressure to low pressure and is perpendicular to the isobars.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

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190. What is a primary difference between Thornthwaite's and Koppen's climate classification systems?
(A) Koppen uses temperature, while Thornthwaite does not.
(B) Thornthwaite's system is based on potential evapotranspiration and water balance, making it more process-oriented.
(C) Koppen's system is used for agriculture, while Thornthwaite's is for urban planning.
(D) Thornthwaite's system ignores precipitation entirely.

191. Consider the following characteristics:
1. Associated with fair, settled weather.
2. Characterized by a high-pressure center.
3. Surface winds diverge outwards.
4. Air subsides from above.

Which weather system is being described?
(A) Cyclone
(B) Anticyclone
(C) Warm Front

(D) Cold Front

192. Which gas, besides Carbon Dioxide, is a major greenhouse gas whose concentration has been significantly increased by human activities like rice cultivation and livestock farming?
(A) Argon
(B) Methane
(C) Ozone
(D) Nitrogen

193. Match the phenomena in List I with their descriptions in List II and select the correct answer using the codes given below.
List I: (Phenomenon)
P. Conduction
Q. Convection
R. Insolation
S. Terrestrial Radiation
List II: (Description)
1. Incoming solar radiation
2. Outgoing longwave radiation from Earth
3. Heat transfer by molecular collision
4. Heat transfer by vertical mass movement of a fluid
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-4, Q-3, R-2, S-1

194. The Subtropical High-Pressure Belts, or Horse Latitudes, are regions of:
(A) Ascending air and heavy precipitation.
(B) Converging surface winds.
(C) Descending air and general atmospheric stability.
(D) The formation of most mid-latitude cyclones.

195. A pilot reports turbulence and observes the formation of cumulonimbus clouds with lightning. The aircraft is most likely experiencing a:
(A) Temperature inversion
(B) Thunderstorm
(C) GLOF
(D) Anticyclone

196. The difference between the temperature of a rising parcel of air and the temperature of the surrounding atmosphere determines:
(A) Atmospheric pressure
(B) Atmospheric stability
(C) The Coriolis effect
(D) The amount of insolation

197. Consider the following characteristics of a tropical cyclone:
1. Forms over land in the tropics.
2. Derives energy from latent heat of condensation.
3. Has a distinct frontal system.
4. Requires significant Coriolis force to develop.
5. Is an intense low-pressure system.
Which of the above statement(s) is/are correct?
(A) 2, 4, and 5
(B) 1, 3, and 5
(C) 2, 3, and 4
(D) 1, 2, and 4

198. The 'Doldrums' refer to a belt of low pressure near the equator. This zone is also known as the:
(A) Polar Front
(B) Subtropical High
(C) Inter-Tropical Convergence Zone (ITCZ)
(D) Horse Latitudes

199. Which of the following is the best example of a "positive feedback loop" in climate change?
(A) Increased CO_2 promotes plant growth which then absorbs additional carbon dioxide from the atmosphere.
(B) Melting Arctic sea ice reduces Earth's albedo, causing more solar absorption and further melting.
(C) Warmer temperatures increase evaporation, leading to more clouds that reflect sunlight and cool the Earth.
(D) Deforestation reduces rainfall levels, causing forests to decline further in a self-sustaining cycle.

200. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : Temperature generally decreases with an increase in altitude.
Reason (R) : As altitude increases, the atmosphere becomes less dense and there are fewer air molecules to absorb and radiate heat.
(A) Both A and R are true and R is the correct explanation of A.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

201. Which of the following layers of the atmosphere has the highest density of gas molecules?
(A) Stratosphere
(B) Troposphere
(C) Mesosphere
(D) Thermosphere

202. Read the given statements and choose the correct option.
Statement I : The Westerlies are prevailing winds in the mid-latitudes, blowing from west to east.
Statement II : The Westerlies originate from the sub-polar low-pressure belt.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

203. The primary reason for the seasons on Earth is:
(A) The tilt of the Earth's rotational axis.
(B) The changing distance between the Earth and the Sun.
(C) The cycle of El Nino and La Nina.
(D) The variation in the Sun's energy output.

204. Match the front types in List I with their map symbols in List II and select the correct answer using the codes given below.
List I: (Front Type)
P. Cold Front
Q. Warm Front
R. Stationary Front
S. Occluded Front
List II: (Symbol on Weather Map)
1. Line with alternating red semi-circles and blue triangles on opposite sides
2. Line with blue triangles
3. Line with purple alternating triangles and semi-circles on the same side
4. Line with red semi-circles
(A) P-2, Q-4, R-1, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-1, R-4, S-3
(D) P-4, Q-2, R-1, S-3

205. What is the most appropriate term for an intense, short-lived, and very localized rainfall event from a convective cloud?
(A) Drizzle
(B) Monsoon
(C) Cloudburst
(D) Drought

206. Consider the following as potential evidences of past climate change:
1. Tree rings
2. Ice cores
3. Ocean sediments
4. Pollen analysis
Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 2 and 4 only
(D) 1, 2, 3 and 4

207. A farmer in the Great Plains of the USA is told that a 'Chinook' wind is expected. The farmer should prepare for:
(A) A sudden, dramatic drop in temperature and heavy snow.
(B) A warm, dry wind that will rapidly melt snow.
(C) A prolonged period of freezing rain.
(D) Extremely strong, cold winds from the north.

208. The term 'Insolation' refers to:
(A) The outgoing heat from the Earth.
(B) The amount of water vapor in the air.
(C) The incoming solar radiation.
(D) The heat trapped by greenhouse gases.

209. Read the given statements and choose the correct option.
Statement I : Anticyclones are associated with divergence of air at the surface and convergence aloft.
Statement II : Cyclones are associated with convergence of air at the surface and divergence aloft.
(A) Both Statement I and Statement II are correct.

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(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

210. Which of the following best describes the path of a temperate cyclone across North America?
(A) Generally from west to east.
(B) Generally from south to north.
(C) Generally from east to west.
(D) Generally stationary over one region.

211. Which two elements are the basis of Koppen's climate classification system?
(A) Temperature and Precipitation
(B) Pressure and Wind
(C) Latitude and Altitude
(D) Air masses and Fronts

212. The Southern Oscillation is the atmospheric 'component' of the ENSO phenomenon. What is the oceanic component?
(A) The North Atlantic Oscillation
(B) El Nino / La Nina
(C) The Indian Ocean Dipole
(D) The Atlantic Meridional Overturning Circulation

213. Arrange the following atmospheric layers in order of increasing altitude from the Earth's surface:
1. Thermosphere
2. Troposphere
3. Stratosphere
4. Mesosphere

Which of the following is the correct sequential order?
(A) 2, 4, 3, 1
(B) 2, 3, 4, 1
(C) 3, 2, 1, 4
(D) 1, 4, 3, 2

214. Which of the following statements correctly pairs a phenomenon with its primary cause?
(A) Land Breeze - Differential heating of land and sea
(B) Coriolis Effect - Pressure Gradient
(C) Tropical Cyclone - Frontal lifting
(D) Temperature Inversion - Strong convection

215. What are the key inputs for Thornthwaite's classification system for determining the moisture regime of a place?
(A) Monthly temperature and precipitation only
(B) Potential evapotranspiration and precipitation
(C) Wind speed and direction
(D) Air mass frequency and frontal zones

216. Consider the following statements about atmospheric pressure:
1. It is the weight of the air column above a certain point.
2. It is measured using a barometer.
3. At sea level, standard atmospheric pressure is approximately 1013.25 millibars.
4. Cold air is denser and generally exerts higher pressure than warm air.
5. Pressure always increases with altitude.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 4
(B) 2, 3, 4, and 5
(C) 1, 2, and 5 only
(D) All of the above

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217. In the Northern Hemisphere, if you stand with your back to the wind, the low pressure area will be to your:
(A) Right (Buys Ballot's Law)
(B) Left (Buys Ballot's Law)
(C) Directly behind you
(D) Directly in front of you

218. The "eye" of a hurricane is characterized by:
(A) Sinking air, light winds, and often clear skies.
(B) The strongest winds and heaviest rain.
(C) Intense thunderstorms and hail.
(D) The highest atmospheric pressure in the storm.

219. Which of the following is NOT a form of precipitation?
(A) Rain
(B) Snow
(C) Fog
(D) Hail

220. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : The amount of water vapor in

the air is highly variable.

Reason (R) : Evaporation and transpiration rates change significantly with temperature and location.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

221. Match the events in List I with their defining features in List II and select the correct answer using the codes given below.

List I: (Event)
P. El Nino
Q. La Nina
R. Temperate Cyclone
S. Tornado

List II: (Defining Feature)
1. Frontal system between air masses
2. Intensification of normal Pacific conditions
3. Violently rotating column of air
4. Warming of the eastern tropical Pacific

(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-2, R-1, S-3
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-4, R-1, S-3

222. The term GLOF is an acronym for:
(A) Global Land Oceanic Flux
(B) Glacial Lake Outburst Flood
(C) Great Lakes Ozone Formation
(D) Ground Level Orographic Fog

223. What type of climate, according to Koppen, would be designated 'ET'?
(A) Ice Cap
(B) Tundra
(C) Taiga
(D) Hot Desert

224. Read the given statements and choose the correct option.

Statement I : The albedo of a surface is the percentage of insolation it reflects.

Statement II : A dark, freshly paved road has a higher albedo than a field of snow.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

225. Which of the following is a key characteristic of the tropopause?
(A) It marks the end of the general decrease in temperature with height.
(B) It is the warmest part of the atmosphere.
(C) It contains the highest concentration of ozone.
(D) It is where most meteors burn up.

226. What is the primary cause of a heat wave?
(A) A rapidly moving cold front.
(B) A persistent high-pressure system that traps warm air over a region.
(C) The arrival of a maritime tropical air mass.
(D) The passage of a strong tropical cyclone.

227. Consider the following statements about atmospheric circulation:
1. The Hadley Cell is a thermally direct circulation.
2. The Ferrel Cell is a thermally indirect circulation.
3. The Polar Cell is a thermally direct circulation.
4. The tricellular model explains the existence of the major pressure belts and planetary winds.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) 1, 2, 3 and 4

228. Which of the following is the most accurate description of a jet stream?
(A) A high-speed river of air in the upper troposphere.
(B) A slow-moving surface wind near the equator.
(C) A seasonal wind reversal, like the monsoon.
(D) A local wind caused by mountain topography.

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229. If the Environmental Lapse Rate (ELR) is greater than the Dry Adiabatic Lapse Rate (DALR), the atmosphere is considered:
(A) Absolutely stable
(B) Absolutely unstable
(C) Conditionally unstable
(D) Neutral

230. A maritime air mass (m) is typically _____, while a continental air mass (c) is typically _____.
(A) cold; warm
(B) moist; dry
(C) dry; moist
(D) stable; unstable

231. Which of the following best defines "climate"?
(A) The state of the atmosphere at a specific time and place.
(B) The long-moving average of weather conditions for a location.
(C) The study of cyclones and anticyclones.
(D) The daily forecast of temperature and precipitation.

232. An occluded front develops when:
(A) A warm front and cold front move parallel to each other.
(B) A cold front catches up with and overtakes a warm front.
(C) A stationary front begins to move.
(D) Two warm air masses converge.

233. Consider the following statements about the causes of climate change:
1. Milankovitch cycles are long-term variations in Earth's orbit.
2. Large volcanic eruptions can have a short-term cooling effect.
3. An increase in sunspot activity may lead to a slight warming.
4. Anthropogenic emissions of CO_2 are a major driver of current warming.
5. Plate tectonics can alter climate over millions of years.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 3, 4, and 5 only
(C) 1, 2, 3, and 5 only
(D) 1, 2, 3, 4, and 5

234. The energy that is stored or released during a change in the state of water (e.g., from liquid to gas) is called:
(A) Latent heat
(B) Sensible heat
(C) Specific heat
(D) Potential heat

235. Read the given statements and choose the correct option.
Statement I : Temperate cyclones are formed along the polar front.
Statement II : Tropical cyclones are thermal lows which originate over warm tropical oceans.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

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236. The pressure gradient force is directed:
(A) Perpendicular to isobars, from high to low pressure.
(B) Parallel to isobars.
(C) At a 45-degree angle to isobars.
(D) Perpendicular to isobars, from low to high pressure.

237. Which of the following is associated with La Nina?
(A) Warmer than average waters in the eastern Pacific.
(B) Weaker than average trade winds.
(C) Exceptionally strong upwelling off the coast of Peru.
(D) Drought in Southeast Asia and Australia.

238. In the Koppen system, the climate of a hot desert is denoted by:
(A) BWh
(B) Aw
(C) BSh
(D) Cfa

239. The catastrophic flooding caused by the sudden draining of a moraine- or ice-dammed lake is known as a:
(A) GLOF

(B) Storm surge
(C) Tsunami
(D) Debris flow

240. The transition zone between the stratosphere and the mesosphere is called the:
(A) Tropopause
(B) Stratopause
(C) Mesopause
(D) Thermopause

241. Read the following Assertion (A) and Reason (R) and choose the correct option.
Assertion (A) : In a temperature inversion, a layer of warm air sits on top of a layer of cold air.
Reason (R) : This condition is highly unstable and leads to strong thunderstorms.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

242. Match the components of the atmosphere in List I with their significance in List II and select the correct answer using the codes given below.
List I: (Component of Atmosphere)
P. Nitrogen
Q. Ozone
R. Water Vapour
S. Carbon Dioxide
List II: (Significance)
1. Variable gas, source of all precipitation
2. Primary greenhouse gas
3. Most plentiful gas, largely inert
4. Absorbs UV radiation in the stratosphere
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-4, Q-3, R-2, S-1

243. The primary human activity that has led to an increase in atmospheric CO_2 concentration is:
(A) Burning of fossil fuels
(B) Nuclear power generation
(C) Use of fertilizers in agriculture
(D) Deforestation for cattle ranching

244. A continental polar (cP) air mass is best described as:
(A) Warm and moist
(B) Cold and dry
(C) Warm and dry
(D) Cold and moist

245. Which of the following is an incorrect pair of wind and its characteristic?
(A) Trade Winds - Reliable winds blowing towards the equator
(B) Westerlies - Prevailing winds of the mid-latitudes
(C) Polar Easterlies - Warm winds originating from the poles
(D) Monsoon - Seasonal reversal of winds

246. Which of these is a direct effect of La Nina?
(A) Below-average rainfall in Southeast Asia.
(B) Warming of the sea surface off Peru.
(C) Stronger-than-normal trade winds in the Pacific.
(D) A negative Southern Oscillation Index (SOI).

247. Which of the following statements about atmospheric layers is correct?
(A) Temperature consistently decreases with altitude throughout the atmosphere.
(B) The stratosphere contains the ozone layer and experiences temperature inversion.
(C) All weather phenomena, including auroras, occur in the troposphere.
(D) The mesosphere is the hottest layer of the atmosphere.

248. The classification of climates by Thornthwaite is considered more 'rational' or 'genetic' than Koppen's because:
(A) It is based on the causes of climatic characteristics, such as water balance and PET.
(B) It is simpler and uses fewer variables.
(C) It is based solely on the types of vegetation found in a region.
(D) It was developed more recently and uses modern satellite data.

249. Consider the following characteristics of temperate (extra-tropical) cyclones:
1. They have a clear frontal system.
2. They can form over both land and sea.
3. They are generally larger in area than

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tropical cyclones.
4. They derive their energy from the temperature contrast between air masses.
5. They do not have a distinct 'eye'.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 4, and 5 only
(C) 1, 2, 3, 4, and 5
(D) 1 and 4 only

250. Read the given statements and choose the correct option.
Statement I : The Sun heats the Earth's surface through longwave radiation.
Statement II : The Earth's surface heats the atmosphere from below through shortwave radiation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

Direction : Please read the following source carefully.

The Earth's atmosphere is a complex, multi-layered gaseous envelope essential for life, primarily composed of a mixture of permanent and variable gases. The permanent gases, which maintain relatively constant proportions, are dominated by Nitrogen (approximately 78%) and Oxygen (approximately 21%), with Argon constituting nearly 1%. These gases provide the basic mass and chemical stability of the atmosphere. In contrast, variable gases, such as Carbon Dioxide, Water Vapour, and Ozone, exist in smaller, fluctuating amounts but exert a significant influence on weather and climate. Structurally, the atmosphere is stratified into distinct layers based on their thermal properties. The lowest layer, the Troposphere, contains about 75% of the atmospheric mass and is where virtually all weather phenomena occur. It is characterized by a general decrease in temperature with increasing altitude, known as the environmental lapse rate. Above it lies the Stratosphere, distinguished by its temperature inversion, where temperature increases with altitude due to the absorption of ultraviolet (UV) radiation by the Ozone layer. The Mesosphere is situated above the Stratosphere, where temperatures again decrease with height. The outermost layer, the Thermosphere, experiences a sharp rise in temperature due to the absorption of intense solar radiation by the sparse gas molecules present.

Based on the above source, attempt the following five questions.

251. According to the passage, which atmospheric layer is characterized by a temperature inversion primarily caused by the absorption of UV radiation?
(A) The Troposphere, due to its proximity to the Earth's surface.
(B) The Stratosphere, due to the presence of the Ozone layer.
(C) The Mesosphere, due to friction with incoming meteoroids.
(D) The Thermosphere, due to direct absorption of intense solar radiation.

252. Which of the following statements can be correctly inferred from the passage regarding the composition of the atmosphere?
(A) Gases that are small in volume can have a disproportionately large impact on climatic processes.
(B) Variable gases like Carbon Dioxide are the most abundant components of the atmosphere.
(C) The proportion of Nitrogen and Oxygen fluctuates significantly depending on weather conditions.
(D) Argon is a variable gas whose concentration is influenced by industrial activities.

253. The passage suggests that the bulk of meteorological events, such as cloud formation and precipitation, are confined to the Troposphere. What is the most likely reason for this?
(A) The temperature in the Troposphere increases with altitude, promoting instability.
(B) The Troposphere is the only layer that directly absorbs UV radiation.
(C) The Troposphere contains the majority of the atmosphere's mass and water vapour.
(D) The pressure in the Troposphere is too low

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to support weather phenomena in other layers.

254. Based on the source, what is the fundamental criterion used to demarcate the principal layers of the atmosphere?
(A) The variation in chemical composition.
(B) The changes in atmospheric pressure.
(C) The density of gas molecules.
(D) The distinct thermal characteristics and temperature gradients.

255. Which of the following is NOT described in the passage as a characteristic of the atmosphere?
(A) A layered structure based on temperature profiles.
(B) A composition dominated by Nitrogen and Oxygen.
(C) The occurrence of the environmental lapse rate in the Mesosphere.
(D) The concentration of weather phenomena in the lowest atmospheric layer.

Direction : Please read the following source carefully.

The Earth's climate system is powered by incoming solar radiation, or insolation, which is not uniformly distributed across the planet's surface. This differential heating is the primary driver of atmospheric and oceanic circulation. The Earth maintains a remarkably stable long-term average temperature by balancing the energy it receives from the sun with the energy it radiates back into space, a concept known as the Earth's heat budget. Insolation arrives as shortwave radiation, and its intensity at the surface is influenced by factors like latitude, time of day, season, and cloud cover. A portion of this incoming radiation is reflected directly back to space by clouds, aerosols, and the Earth's surface; this reflectivity is termed albedo. The energy that is absorbed by the surface heats it, and the Earth, in turn, radiates this energy back towards space in the form of longwave (infrared) radiation. Certain atmospheric gases, known as greenhouse gases, absorb and re-emit some of this outgoing longwave radiation, which warms the lower atmosphere. Annually, there is a net energy surplus in the tropical regions and a net energy deficit in the polar regions. This imbalance is rectified by the poleward transport of heat through atmospheric and oceanic currents, maintaining global thermal equilibrium.

Based on the above source, attempt the following five questions.

256. According to the passage, the Earth's heat budget is best described as:
(A) The total amount of solar energy that reaches the Earth's outer atmosphere.
(B) The equilibrium between absorbed incoming shortwave radiation and emitted outgoing longwave radiation.
(C) The process of heat transfer from equatorial to polar regions via ocean currents.
(D) The measure of reflectivity, or albedo, of the Earth's surface and atmosphere.

257. What can be inferred about the role of albedo in the Earth's heat budget?
(A) Higher albedo leads to greater absorption of solar energy and atmospheric warming.
(B) Albedo is the primary mechanism for trapping outgoing longwave radiation.
(C) Albedo is uniform across all surfaces and times of the year.
(D) An increase in global albedo would result in a net cooling effect on the planet.

258. The passage states that there is a net energy surplus in the tropics and a deficit in the polar regions. This imbalance is primarily responsible for which of the following?
(A) The global circulation of the atmosphere and oceans.
(B) The existence of the greenhouse effect.
(C) The phenomenon of insolation.
(D) The variation in the length of day and night.

259. Based on the description in the source, the energy radiated by the Earth's surface differs from incoming solar radiation in that it is primarily:
(A) Shortwave radiation.
(B) Ultraviolet radiation.
(C) Longwave radiation.
(D) Visible light.

260. Which factor is NOT mentioned in the text as an influence on the amount of insolation received at the Earth's surface?
(A) Earth's magnetic field.
(B) Cloud cover.

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(C) Latitude.
(D) Season of the year.

Direction : Please read the following source carefully.

The distribution of atmospheric pressure across the Earth's surface is fundamentally linked to temperature and is a critical determinant of wind patterns. Atmospheric pressure is the force exerted by the weight of the air above a given point. Areas of high pressure, often associated with cold, dense, sinking air, are known as anticyclones, while areas of low pressure, linked to warm, light, rising air, are known as cyclones or depressions. The difference in pressure between two locations creates a pressure gradient force, which initiates the movement of air from high pressure to low pressure. This movement is what we perceive as wind. However, the path of this moving air is not direct. The Earth's rotation introduces the Coriolis force, which deflects moving air to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This deflection is strongest at the poles and nonexistent at the equator. In the upper atmosphere, the pressure gradient force and the Coriolis force can balance each other to produce geostrophic winds that flow parallel to isobars. Near the surface, a third force, friction, acts to slow the wind down and reduces the effect of the Coriolis force, causing winds to flow across isobars at an angle towards the low-pressure center.

Based on the above source, attempt the following five questions.

261. According to the passage, the initial movement of air, or wind, is caused by:
(A) The Coriolis force deflecting the air.
(B) The force exerted by friction from the Earth's surface.
(C) The sinking of cold, dense air in high-pressure systems.
(D) The existence of a pressure gradient between two locations.

262. What can be inferred about the path of surface winds in the Northern Hemisphere based on the forces described?
(A) They flow directly from high to low pressure without any deflection.
(B) They are deflected to the right, crossing isobars at an angle towards the low-pressure area.
(C) They flow parallel to the isobars due to a balance between pressure gradient and Coriolis forces.
(D) They are deflected to the left, moving away from low-pressure centers.

263. The source states that the Coriolis force is nonexistent at the equator. What is a logical consequence of this fact?
(A) Air pressure remains constant along the equatorial belt.
(B) The pressure gradient force is also zero at the equator, resulting in calm conditions.
(C) Winds at the equator flow directly from high to low pressure, largely unaffected by deflection.
(D) Friction is the dominant force controlling wind direction at the equator.

NODIA

264. How does the passage differentiate between low-pressure and high-pressure areas?
(A) Low pressure is associated with cold, sinking air, while high pressure is linked to warm, rising air.
(B) Low pressure is associated with geostrophic winds, while high pressure is linked to surface winds.
(C) Low pressure is found exclusively in the Northern Hemisphere, and high pressure in the Southern Hemisphere.
(D) Low pressure is linked to warm, rising air, while high pressure is associated with cold, sinking air.

265. Geostrophic winds, as described in the text, are a result of a balance between which two forces?
(A) Pressure gradient force and Coriolis force.
(B) Pressure gradient force and friction.
(C) Coriolis force and friction.
(D) Gravity and pressure gradient force.

Direction : Please read the following source carefully.

Atmospheric circulation involves the movement of large, distinct bodies of air known as air masses. An air mass is a voluminous parcel of air that acquires the temperature and moisture characteristics of its source region, which is an extensive area of the Earth's surface where the air

can remain stationary for a prolonged period. Air masses are classified based on their source region's latitude (determining thermal properties) and the nature of the surface (determining moisture content). For instance, a continental polar (cP) air mass is cold and dry, having formed over a high-latitude landmass, while a maritime tropical (mT) air mass is warm and humid, originating over a low-latitude ocean. When two different air masses meet, they do not mix easily due to their density differences. Instead, they form a boundary zone called a front. The interaction at these fronts is a primary cause of weather changes. A cold front occurs when a colder, denser air mass actively advances and displaces a warmer air mass, often leading to rapid cooling, steep cloud formation, and intense, short-lived precipitation. Conversely, a warm front forms when a warmer, less dense air mass overrides a colder air mass, typically resulting in a gradual temperature increase, widespread stratiform clouds, and prolonged, gentle precipitation.

Based on the above source, attempt the following five questions.

266. Based on the classification system described in the passage, an air mass originating over a low-latitude ocean would be designated as:
(A) continental polar (cP).
(B) maritime tropical (mT).
(C) continental tropical (cT).
(D) maritime polar (mP).

267. What is the fundamental reason provided in the text for the formation of a front?
(A) The easy mixing of two similar air masses.
(B) The difference in density between two colliding air masses.
(C) The seasonal migration of air masses across continents.
(D) The uniform temperature and moisture within a single air mass.

268. According to the passage, which of the following weather patterns is most characteristic of the passage of a cold front?
(A) Rapid temperature drop and intense, short-duration precipitation.
(B) Gradual temperature increase and prolonged, gentle rain.
(C) Widespread, layered clouds and steady, light drizzle.
(D) A long period of clear skies and calm winds before the front's arrival.

NODIA

269. It can be inferred from the passage that the "source region" of an air mass must be an area with what characteristics?
(A) A zone of frequent storms and dynamic weather changes.
(B) A geographically small and topographically diverse landscape.
(C) An extensive surface with relatively uniform conditions where air can stagnate.
(D) A transitional boundary between a continent and an ocean.

270. How does the passage distinguish a warm front from a cold front?
(A) A warm front involves a colder air mass advancing, while a cold front involves a warmer air mass advancing.
(B) Warm fronts produce intense, short-lived storms, while cold fronts produce gentle, prolonged precipitation.
(C) Warm fronts are designated 'mT', while cold fronts are designated 'cP'.
(D) A warm front involves a warmer air mass overriding a colder one, while a cold front involves a colder air mass displacing a warmer one.

Direction : Please read the following source carefully.

While surface winds are significantly influenced by friction, the dynamics of the upper atmosphere, particularly in the mid to upper troposphere, are governed by a different set of principles, leading to what is known as upper air circulation. At these altitudes, the frictional drag from the Earth's surface becomes negligible. As a result, the wind is primarily a product of the balance between the pressure gradient force and the Coriolis force. This balance results in geostrophic winds, which flow parallel to the isobars rather than across them. A key feature of this upper air circulation is the existence of jet streams, which are narrow bands of very strong, predominantly westerly winds concentrated in the upper troposphere. These high-velocity air currents are found near the boundaries of major air masses where there is a significant horizontal temperature gradient.

The polar jet stream and the subtropical jet stream are the two most prominent examples. The position and strength of these jet streams are not static; they meander in a wave-like pattern and shift seasonally. This upper air circulation has a profound influence on surface weather systems, acting as a steering mechanism for the movement of surface cyclones and anticyclones and contributing to their development and dissipation.

Based on the above source, attempt the following five questions.

271. What is the primary reason that geostrophic winds in the upper atmosphere flow parallel to isobars?
(A) The dominance of the pressure gradient force over the Coriolis force.
(B) The significant influence of surface friction at high altitudes.
(C) The balance achieved between the pressure gradient force and the Coriolis force.
(D) The high velocity of the winds within the jet stream.

272. According to the passage, jet streams are best described as:
(A) Slow, meandering air currents in the lower stratosphere.
(B) Narrow, high-velocity wind bands in the upper troposphere.
(C) Wide zones of uniform wind speed throughout the troposphere.
(D) Surface-level winds that are steered by upper air circulation.

273. Based on the information provided, where are jet streams most likely to be found?
(A) In areas with uniform temperature and pressure.
(B) At the equator, where the Coriolis force is weakest.
(C) In the lower troposphere, where friction is strongest.
(D) Along the boundaries between contrasting air masses.

274. It can be inferred from the passage that upper air circulation plays what role in relation to surface weather?
(A) It acts as a guiding force, influencing the path and intensity of cyclones and anticyclones.
(B) It has a negligible effect on the movement of surface weather systems.
(C) It directly causes the formation of surface-level geostrophic winds.
(D) It is completely independent of and isolated from surface weather phenomena.

275. The passage suggests that the primary difference between the forces governing surface winds and upper air winds is the:
(A) absence of the Coriolis force in the upper atmosphere.
(B) lack of a pressure gradient force at the surface.
(C) negligible effect of friction in the upper atmosphere.
(D) stronger influence of gravity on upper air winds.

Direction : Please read the following source carefully.

Cyclones and anticyclones are large-scale atmospheric circulation systems that rotate around centers of low and high pressure, respectively. Cyclones, characterized by low central pressure and inward-spiraling winds, are broadly divided into tropical and temperate (or extratropical) types, which differ significantly in their formation and energy source. Tropical cyclones, known as hurricanes or typhoons in different regions, form exclusively over warm tropical oceans and derive their immense energy from the release of latent heat of condensation as moist air rises and cools. They are warm-core systems with no associated fronts. In contrast, temperate cyclones form in the mid-latitudes along the boundary between cold and warm air masses, known as the polar front. Their energy is derived from the temperature contrast between these colliding air masses. Temperate cyclones are large, asymmetrical weather systems associated with cold and warm fronts, producing a wide variety of weather conditions. Anticyclones are high-pressure systems with outward-spiraling winds. They are generally associated with stable atmospheric conditions, clear skies, and calm weather, acting as blocking systems that can influence the paths of cyclones and lead to prolonged periods of settled weather, such as heat waves in summer or cold snaps in winter.

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Based on the above source, attempt the following five questions.

276. What is the primary energy source for a tropical cyclone as described in the passage?
(A) The release of latent heat from condensing water vapour.
(B) The temperature contrast between colliding air masses.
(C) The potential energy from the high-pressure center.
(D) The strong westerly winds of the jet stream.

277. According to the text, a key difference between tropical and temperate cyclones is that:
(A) temperate cyclones form over warm oceans, while tropical cyclones form over land.
(B) tropical cyclones have a high-pressure center, while temperate cyclones have a low-pressure center.
(C) tropical cyclones derive energy from temperature contrasts, and temperate cyclones from latent heat.
(D) temperate cyclones are associated with fronts, whereas tropical cyclones are not.

278. Which weather conditions are most typically associated with an anticyclone?
(A) Inward-spiraling winds, cloud formation, and precipitation.
(B) Stable atmosphere, clear skies, and calm conditions.
(C) Frontal systems with a mix of rain and snow.
(D) The release of latent heat and storm surges.

279. Based on the passage, where do temperate cyclones typically form?
(A) Exclusively over warm tropical oceans near the equator.
(B) Within a single, uniform tropical air mass.
(C) Along the polar front in the mid-latitudes.
(D) In high-pressure zones associated with stable weather.

280. It can be inferred that the term "warm-core system" used to describe a tropical cyclone implies that:
(A) the cyclone is warmest at its outer edges.
(B) the cyclone can only form over land with high surface temperatures.
(C) the cyclone weakens when it moves over colder water.
(D) the center of the storm is warmer than its surroundings at the same altitude.

Direction : Please read the following source carefully.

Climatic classification systems aim to organize the world's diverse climates into a coherent and understandable framework. One of the most widely used systems is the empirical classification developed by Wladimir Köppen. The Köppen system is based on the idea that native vegetation is the best expression of climate, so climate boundaries were selected with vegetation distribution in mind. Its scheme uses a combination of letters to describe climate types, primarily based on annual and monthly averages of temperature and precipitation. The classification identifies five principal climate groups, designated by capital letters: A (Tropical), B (Dry), C (Temperate), D (Continental), and E (Polar). Each of these major groups is further subdivided based on seasonal precipitation patterns and temperature characteristics. For example, the second letter may indicate the seasonality of precipitation (e.g., f for no dry season, m for monsoon, w for winter dry season), and a third letter can provide more detail on temperature levels. The strength of the Köppen system lies in its simplicity, use of easily obtainable data, and its direct correlation with vegetation patterns, making it a valuable tool for geography, ecology, and other environmental sciences. A different approach was taken by C.W. Thornthwaite, whose classification is more complex and based on the concept of potential evapotranspiration (PET), which he considered a crucial determinant of water availability for plants.

Based on the above source, attempt the following five questions.

281. What is the fundamental principle underlying the Köppen climatic classification system?
(A) The distribution of natural vegetation is the ultimate expression of a region's climate.
(B) Climate is best defined by atmospheric pressure and wind patterns.
(C) Potential evapotranspiration is the most critical climatic variable.
(D) Climatic boundaries should be based on latitude and longitude alone.

NODIA

282. According to the passage, the five principal climate groups in the Köppen system (A, B, C, D, E) are primarily differentiated by:
(A) vegetation type and soil quality.
(B) major temperature and precipitation characteristics.
(C) potential evapotranspiration rates.
(D) the frequency of meteorological hazards.

283. How does the passage contrast the Köppen system with the Thornthwaite system?
(A) Köppen's system is complex, while Thornthwaite's is simple and based on vegetation.
(B) Köppen's system uses temperature and precipitation, while Thornthwaite's focuses on potential evapotranspiration.
(C) Köppen identified five climate groups, whereas Thornthwaite identified only three.
(D) Köppen's system is theoretical, while Thornthwaite's system is empirical.

284. In the context of the Köppen system as described, what might a classification of 'Aw' signify?
(A) A tropical climate with a distinct dry season in the winter.
(B) A polar climate with a winter dry season.
(C) A dry climate with monsoonal rain.
(D) A temperate climate with no dry season.

285. The passage highlights the value of the Köppen system. What is identified as one of its primary strengths?
(A) Its complexity and inclusion of all meteorological variables.
(B) Its focus on a theoretical water balance rather than observed data.
(C) Its simplicity and reliance on readily available temperature and precipitation data.
(D) Its ability to predict short-term weather changes.

Direction : Please read the following source carefully.

The El Niño-Southern Oscillation (ENSO) is a large-scale, periodic fluctuation in sea surface temperatures, atmospheric pressure, and circulation across the equatorial Pacific Ocean. It represents a critical mode of ocean-atmosphere interaction with significant global weather and climate implications. ENSO operates between three phases: a warm phase (El Niño), a cold phase (La Niña), and a neutral phase. During an El Niño event, the normal trade winds weaken, allowing warm surface water from the western Pacific to move eastward towards the coast of South America. This displacement of warm water suppresses the upwelling of cold, nutrient-rich deep water, leading to profound impacts on marine ecosystems and fisheries. It also alters atmospheric circulation, shifting rainfall patterns globally, often causing droughts in the western Pacific (e.g., Australia, Indonesia) and heavy rains and flooding in the eastern Pacific (e.g., Peru, Ecuador). La Niña is essentially the opposite, an enhancement of the normal conditions, with stronger-than-average trade winds pushing more warm water to the west and increasing upwelling in the east. The atmospheric component, the Southern Oscillation, refers to the see-saw pattern of atmospheric pressure between the eastern and western tropical Pacific, which is intrinsically linked to the oceanic changes of El Niño and La Niña.

Based on the above source, attempt the following five questions.

286. According to the passage, what is the defining characteristic of an El Niño event?
(A) The strengthening of trade winds across the Pacific.
(B) An increase in the upwelling of cold, nutrient-rich water off South America.
(C) A decrease in sea surface temperatures in the eastern Pacific.
(D) The eastward movement of warm surface water in the equatorial Pacific.

287. The passage describes the Southern Oscillation as:
(A) the periodic fluctuation of sea surface temperatures.
(B) the global shift in rainfall patterns caused by ENSO.
(C) a recurring pattern of atmospheric pressure changes across the tropical Pacific.
(D) the suppression of upwelling along the coast of Peru.

288. What is a described consequence of a La Niña event?

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(A) A weakening of the normal trade winds.
(B) An intensification of normal Pacific atmospheric and oceanic conditions.
(C) A suppression of oceanic upwelling in the eastern Pacific.
(D) The occurrence of drought conditions in Peru and Ecuador.

289. It can be inferred from the passage that the "suppression of upwelling" during El Niño has a negative impact on:
(A) tourism in Australia and Indonesia.
(B) the strength of the Pacific trade winds.
(C) rainfall totals in the western Pacific.
(D) marine life and fishing industries off the coast of South America.

290. ENSO is presented in the text as an example of what larger phenomenon?
(A) The interaction and coupling between the ocean and the atmosphere.
(B) A purely atmospheric circulation pattern.
(C) A long-term, irreversible climate change.
(D) A seasonal variation in sea level.

Direction : Please read the following source carefully.

Meteorological hazards are natural phenomena of atmospheric origin that have the potential to cause loss of life, property damage, and environmental degradation. These events range in scale from localized, short-lived storms to large-scale, prolonged conditions. Thunderstorms, for instance, are intense local storms associated with tall cumulonimbus clouds, lightning, thunder, and often heavy rain or hail. Under specific conditions of extreme atmospheric instability and wind shear, a thunderstorm can spawn a tornado, a violently rotating column of air in contact with the ground, characterized by exceptionally high wind speeds and destructive potential. Hailstorms, which can occur during severe thunderstorms, produce balls or lumps of ice that can damage crops and property. A cloudburst refers to an extreme amount of precipitation in a short period of time, sometimes leading to flash floods. A distinct but related hazard, particularly in high-mountain regions, is the Glacial Lake Outburst Flood (GLOF), a sudden release of a large amount of water from a lake dammed by a glacier or moraine, which can be triggered by various factors including heavy rainfall or icefall. Other significant hazards include prolonged heat and cold waves, which are extended periods of excessively hot or cold weather, and droughts, which are characterized by a protracted deficiency in precipitation resulting in a water shortage.

Based on the above source, attempt the following five questions.

NODIA

291. According to the passage, a tornado is described as being spawned from what larger weather phenomenon?
(A) A heat wave.
(B) A Glacial Lake Outburst Flood.
(C) A thunderstorm.
(D) A drought.

292. How does the passage define a "cloudburst"?
(A) An extreme amount of rainfall occurring in a short duration.
(B) A prolonged period with no precipitation.
(C) A violent rotation of air in contact with the ground.
(D) A sudden release of water from a glacial lake.

293. Based on the description, a Glacial Lake Outburst Flood (GLOF) is a hazard specifically associated with which type of environment?
(A) Arid desert regions.
(B) Tropical coastal areas.
(C) Flat agricultural plains.
(D) High-mountain and glacial regions.

294. Which of the following pairs of hazards are presented in the text as prolonged conditions rather than short-lived storm events?
(A) Tornadoes and hailstorms.
(B) Droughts and heat waves.
(C) Thunderstorms and cloudbursts.
(D) GLOFs and tornadoes.

295. The passage implies that the primary difference between a thunderstorm and a tornado is that a tornado involves:
(A) the presence of lightning and thunder.
(B) the formation of ice pellets or hailstones.
(C) a violently rotating column of air.
(D) heavy precipitation over a large area.

Direction : Please read the following source carefully.

The Earth's climate has never been static, with evidence of significant past climatic changes found in geological records, ice cores, and fossil evidence. These natural changes were driven by factors such as variations in Earth's orbit (Milankovitch cycles), volcanic activity, and fluctuations in solar output. However, in the contemporary era, the discussion on climate change is dominated by the human impact on the global climate system. The primary mechanism of this impact is the enhancement of the natural greenhouse effect. Human activities, particularly the burning of fossil fuels for energy and industry, deforestation, and certain agricultural practices, have led to a substantial increase in the atmospheric concentration of greenhouse gases (GHGs), most notably carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases are efficient at trapping outgoing longwave radiation, leading to a net warming of the lower atmosphere and the Earth's surface, a phenomenon referred to as global warming. This anthropogenic warming is not just an increase in average temperature; it manifests as a complex suite of changes across the climate system, including altered precipitation patterns, rising sea levels, and an increased frequency and intensity of certain extreme weather events, fundamentally altering the global climate at an unprecedented rate.

Based on the above source, attempt the following five questions.

296. According to the passage, what is the principal way in which human activities are impacting the global climate?
(A) By directly increasing the sun's output of solar radiation.
(B) By altering the Earth's orbit around the sun.
(C) By increasing the planet's albedo through deforestation.
(D) By intensifying the natural greenhouse effect through GHG emissions.

297. The passage mentions several causes of past, natural climate change. Which of the following is NOT listed as a natural driver?
(A) The burning of fossil fuels.
(B) Variations in the Earth's orbit.
(C) Fluctuations in solar output.
(D) Volcanic activity.

298. What is the phenomenon of "global warming" described as in the text?
(A) The natural cycle of ice ages and interglacial periods.
(B) The net warming of the lower atmosphere and surface due to trapped longwave radiation.
(C) A localized increase in temperature caused by urban development.
(D) The cooling of the stratosphere due to ozone depletion.

299. It can be inferred from the passage that greenhouse gases like CO_2 and CH_4 contribute to warming by:
(A) absorbing incoming shortwave solar radiation.
(B) trapping heat that is radiated away from the Earth's surface.
(C) destroying the stratospheric ozone layer.
(D) increasing the amount of energy the sun emits.

300. The passage suggests that the consequences of human-induced climate change are:
(A) a wide-ranging set of systemic changes including altered precipitation and sea-level rise.
(B) limited to a simple, uniform increase in global average temperature.
(C) primarily beneficial, leading to better agricultural conditions globally.
(D) temporary and likely to be reversed by natural cycles within a few years.

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ANSWERS

1. (B) Nitrogen
Nitrogen and oxygen are permanent gases because their proportions remain constant in the atmosphere up to about 80-90 kilometers. Nitrogen makes up 78 percent of the dry atmosphere and is essential for life, though mostly inert in its gaseous form. Unlike variable gases like water vapour or ozone, its concentration does not fluctuate significantly with location or time, providing a stable and reliable atmospheric composition.

2. (A) Troposphere
The troposphere is the lowest layer of the atmosphere, extending from the Earth's surface to an average height of about 13 kilometers. It contains approximately eighty percent of the atmosphere's total mass and almost all its water vapour. This layer is where most weather phenomena, such as clouds, rain, and storms, occur because of the presence of moisture and active vertical air movement.

3. (A) Both Statement I and Statement II are correct.
Temperature decreases with altitude in the troposphere at an average rate of 6.5 degrees Celsius per kilometer. This occurs because the atmosphere is primarily heated from below by longwave terrestrial radiation emitted by the Earth's surface. As solar radiation passes through the atmosphere, it is absorbed by the ground, which then re-radiates heat, making the lowest layers of the air warmer than those above.

4. (D) Ozone is most abundantly found in the troposphere, causing weather changes.
Ozone is primarily concentrated in the stratosphere, specifically between fifteen and thirty-five kilometers above the Earth's surface, where it serves as a protective layer against ultraviolet radiation. While small amounts exist in the troposphere as a pollutant, it is not the most abundant layer for ozone. Weather changes are driven by water vapour and temperature gradients in the troposphere rather than ozone concentration levels.

5. (A) P-4, Q-1, R-2, S-3
The troposphere is the layer where all weather phenomena take place due to vertical air mixing. The stratosphere contains the protective ozone layer which absorbs ultraviolet rays. The mesosphere is known as the coldest layer, where temperature decreases with height. The thermosphere experiences a temperature increase with altitude due to solar activity. These characteristics define the vertical structure of the atmosphere from the surface upwards.

6. (B) Convection
Convection involves the transfer of heat through the vertical movement of fluids, such as air or water. When the Earth's surface is heated, the air in contact with it warms, expands, and becomes less dense, causing it to rise. This upward movement creates currents that transport heat energy into higher levels of the atmosphere. It is a fundamental process in weather formation and cloud development.

NODIA

7. (D) Insolation
Insolation is the term for the solar energy that reaches the Earth's surface after passing through the atmosphere. It is shortwave electromagnetic radiation emitted by the sun. The amount of insolation received at any given point varies based on the angle of the sun's rays, the duration of daylight, and atmospheric transparency. This energy is the primary driver of the Earth's climate and weather patterns.

8. (A) Both A and R are true and R is the correct explanation of A.
While the sun emits a massive amount of energy, only a tiny fraction reaches the Earth's surface. This reduction occurs because the atmosphere acts as a filter, where particles and gases scatter, reflect, and absorb a significant portion of the incoming shortwave solar radiation. Consequently, the actual insolation measured at the surface is much lower than the total energy initially directed toward the planet.

9. (C) The balance between incoming solar radiation and outgoing terrestrial radiation.
The heat budget represents the delicate equilibrium maintained between the amount of solar energy received by the Earth and the amount of longwave radiation emitted back into space. This balance ensures that the planet maintains a relatively constant average temperature over time. If the incoming energy exceeded the outgoing energy, the Earth would continuously warm, while the opposite would lead to gradual cooling.

10. (A) The Earth's magnetic field
The amount of solar radiation received at a specific location is primarily determined by the angle of incidence, daylight duration, and atmospheric conditions like cloud cover. The Earth's magnetic field plays a crucial role in protecting the planet from solar wind and cosmic rays, but it does not significantly influence the intensity or quantity of insolation reaching the surface, which is a radiative process.

11. (C) 1, 2 and 3
The Earth stays at a stable temperature by radiating back the same amount of energy it receives from the sun. Albedo refers to the percentage of solar radiation reflected by a surface without being absorbed. Longwave terrestrial radiation is the primary mechanism for heating the atmosphere from the ground up. However, clouds significantly impact the heat budget by reflecting solar radiation and trapping outgoing heat.

12. (B) Advection
Advection is the process of heat transfer through the horizontal movement of air masses across the Earth's surface. In the middle latitudes, most diurnal variations in daily weather are caused by this horizontal transport. Unlike convection, which involves vertical movement, advection carries heat from warmer regions to cooler ones, such as tropical air moving toward the poles, playing a vital role in global temperature distribution.

13. (C) The fraction of incident radiation that is reflected by a surface.
Albedo is a measure of the reflectivity of a surface, expressed as the ratio of reflected radiation to the total incident radiation. Surfaces with high albedo, such as fresh snow or thick clouds, reflect most of the solar energy they receive. Surfaces with low albedo, like dark soil or oceans, absorb most of the energy. This concept is critical for understanding the Earth's energy balance.

14. (D) Temperature inversion
Under normal conditions, temperature decreases with height in the troposphere. However, a temperature inversion occurs when a layer of warmer air lies above a layer of cooler air near the surface. This phenomenon often happens on clear, calm nights when the ground radiates heat rapidly, cooling the air in direct contact with it. Inversions create very stable atmospheric conditions and can trap pollutants near the ground.

15. (D) Statement I is incorrect but Statement II is correct.
Isotherms are lines on a map that connect points experiencing the same temperature at a given time. They are used to visualize the horizontal distribution of temperature across different regions. In contrast, lines connecting points of equal atmospheric pressure are called isobars. Therefore, while isotherms are essential tools for mapping temperature patterns, they have no relationship with pressure measurements, making the first statement fundamentally wrong.

16. (B) Latitude
Latitude is the primary factor influencing the horizontal distribution of temperature because it determines the angle of the sun's rays and the duration of daylight. Regions near the equator receive direct sunlight, leading to higher temperatures, while polar regions receive slanted rays over a larger area, resulting in lower temperatures. While altitude and ocean currents also affect local climates, latitude provides the fundamental global temperature gradient.

17. (B) P-4, Q-2, R-1, S-3
Solar energy reaches the Earth through radiation, which requires no medium. Conduction transfers heat through direct contact, such as from a pan to its handle. Convection is the vertical movement of heated air parcels as they become less dense and rise. Advection is the horizontal movement of air that redistributes heat across different latitudes.

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Together, these four processes are responsible for the complex movement of energy within the atmosphere.

18. (A) Differential heating of the Earth's surface
Atmospheric pressure differences are primarily caused by the unequal heating of the Earth's surface by the sun. When air is heated, it expands and becomes less dense, creating a low-pressure area. Conversely, cool air is denser and sinks, creating a high-pressure area. These pressure gradients are the fundamental drivers of wind, as air naturally moves from regions of high pressure to regions of low pressure.

19. (C) Pressure Gradient Force
The movement of air is triggered by the pressure gradient force, which exists when there is a difference in atmospheric pressure between two locations. This force acts from high pressure toward low pressure, perpendicular to the isobars. The magnitude of this force is determined by the steepness of the pressure change over a given distance. Without this initial force, wind would not begin to blow across the Earth's surface.

20. (B) 4, 2, 1, 3
The atmosphere is structured into distinct layers based on temperature changes. Starting from the surface, the troposphere is the first layer where weather occurs. Above it lies the stratosphere, followed by the mesosphere, which is the coldest region. Finally, the thermosphere extends into the upper reaches of the atmosphere. This sequence is defined by the varying ways each layer interacts with solar radiation and terrestrial heat energy.

21. (C) Coriolis force
The Coriolis force is an apparent force caused by the Earth's rotation. It deflects moving objects, including wind, to the right of their path in the Northern Hemisphere and to the left in the Southern Hemisphere. This force is zero at the equator and increases toward the poles. It does not initiate wind but modifies its direction, playing a critical role in the formation of global wind patterns.

22. (A) 1 and 2 only
Planetary winds, such as trades and westerlies, blow consistently throughout the year across large portions of the globe. Periodic winds like land and sea breezes change direction based on daily or seasonal heating patterns. However, the Coriolis force is actually weakest at the equator and strongest at the poles. Furthermore, lines of equal wind speed are called isotachs, while isobars are lines that connect points of equal atmospheric pressure.

23. (D) Monsoon
Planetary winds are large-scale wind systems that blow consistently in the same direction throughout the year, including trade winds, westerlies, and polar easterlies. Monsoons, however, are classified as seasonal or periodic winds because they reverse their direction according to the time of year. They are caused by the differential heating of large landmasses and oceans, rather than being part of the permanent global circulation.

24. (B) Both A and R are true but R is not the correct explanation of A.
The Coriolis force is absent at the equator and reaches its maximum at the poles. While it is true that the Earth's rotational speed is highest at the equator, this fact alone does not explain why the force is zero there. The Coriolis effect is mathematically dependent on the sine of the latitude; since the sine of zero degrees is zero, the force disappears regardless of the high rotational velocity.

25. (C) Hadley, Ferrel, and Polar cells
The tricellular model describes the global circulation of the atmosphere through three distinct cells in each hemisphere. The Hadley cell operates between the equator and subtropics, driven by rising warm air. The Polar cell exists at high latitudes, driven by sinking cold air. The Ferrel cell is located between them in the mid-latitudes and is considered a thermally indirect cell, functioning as a link between the other two.

26. (A) Air-mass
An air mass is a massive volume of air, often covering thousands of square kilometers, that exhibits relatively uniform temperature and moisture characteristics at any given altitude. These properties are acquired when the air remains stationary over a large, uniform surface called a source region for an extended period. When an air mass moves, it carries these

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characteristics to new regions, significantly influencing the local weather patterns.

27. (D) Front
A front is the narrow transition zone or boundary that separates two air masses with different densities, usually due to variations in temperature and humidity. Fronts are the primary sites for weather activity, as the interaction between contrasting air masses often leads to the lifting of air, cloud formation, and precipitation. There are four main types of fronts: cold, warm, stationary, and occluded, each with distinct characteristics.

28. (B) A cold air mass actively pushes up a warm air mass.
A cold front occurs when a denser, colder air mass advances into a region occupied by warmer air. Because the cold air is heavier, it wedges underneath the warm air, forcing it to rise abruptly. This rapid lifting often results in the formation of towering cumulonimbus clouds and intense, short-duration weather events like thunderstorms and heavy rain. The slope of a cold front is typically much steeper than a warm front.

29. (C) They flow from east to west in both hemispheres.
Jet streams are high-altitude, fast-moving currents of air located near the tropopause. They play a fundamental role in steering weather systems and influencing the intensity of storms. However, the statement that they flow from east to west is incorrect; in both the Northern and Southern Hemispheres, the primary jet streams flow from west to east. This eastward motion is driven by the Earth's rotation and temperature gradients between latitudes.

30. (A) 1, 2, 3, and 5
Air masses are classified using letters that denote their source region. Lowercase 'c' stands for continental (dry) and 'm' for maritime (humid). Uppercase 'T' represents tropical (warm) and 'P' represents polar (cold). Therefore, 'cP' would be cold and dry, while 'cT' is hot and dry. Statement four is incorrect because 'P' refers to a cold polar region, not a warm one. All other descriptions accurately reflect standard meteorological designations.

31. (A) Polar front
Temperate cyclones, also called extra-tropical cyclones, typically originate along the polar front, which is the boundary where warm subtropical air meets cold polar air. This contrast in temperature and density creates instability, leading to the development of a wave-like disturbance. As the cyclone matures, it develops distinct cold and warm fronts, circulating around a low-pressure center. These systems are common in the mid-latitude regions across the globe.

32. (B) Calm weather and clear skies
The eye is the central region of a mature tropical cyclone and is remarkably different from the rest of the storm. It is characterized by subsiding air, which inhibits cloud formation, leading to calm winds and often clear skies. Surrounding the eye is the eyewall, where the most intense winds and heaviest rainfall occur. The low pressure at the surface of the eye is the lowest in the entire system.

33. (A) Both Statement I and Statement II are correct.
Tropical cyclones require warm ocean waters, typically above 26.5 degrees Celsius, to provide the necessary moisture and heat. As the warm, moist air rises and cools, water vapour condenses into droplets, releasing latent heat. This released energy acts as the primary fuel for the cyclone, intensifying the low-pressure system and driving the high-speed winds. Both statements correctly identify the essential environmental conditions and energy source for these powerful storms.

NODIA

34. (A) A high-pressure center and anticyclonic air circulation.
An anticyclone is a large-scale weather system centered on a region of high atmospheric pressure. In the Northern Hemisphere, the winds circulate in a clockwise direction, while in the Southern Hemisphere, they move counter-clockwise. Because air in an anticyclone sinks and diverges at the surface, it typically suppresses cloud formation, leading to clear skies and stable weather conditions. This circulation pattern is the opposite of a low-pressure cyclone.

35. (A) P-4, Q-3, R-2, S-1
The Hadley cell operates in low latitudes near the equator. The Ferrel cell is found in the mid-latitudes, while the Polar cell is located at high

latitudes. Jet streams are concentrated bands of high-speed winds found in the upper troposphere. This distribution illustrates how the atmosphere organizes itself to transport heat from the warm equatorial regions toward the colder polar regions of the planet.

36. (D) Strong vertical wind shear
Tropical cyclones require several conditions to form, including warm sea temperatures, a pre-existing low-pressure disturbance, and a significant Coriolis force. However, strong vertical wind shear—the change in wind speed or direction with height—is actually detrimental to cyclone formation. It can disrupt the organized vertical structure of the developing storm. Instead, weak vertical wind shear is necessary to allow the convective system to grow and intensify into a cyclone.

37. (C) Tropical Moist Climates
In Koppen's climatic classification system, the letter 'A' is used to designate tropical moist climates. These regions are characterized by consistently high temperatures throughout the year, with every month having an average temperature above 18 degrees Celsius. These climates typically experience significant precipitation and lack a true winter season. They are generally found in the equatorial and tropical regions, supporting diverse ecosystems like rainforests and savannas.

38. (B) The relationship between precipitation and evaporation.
The 'B' group in Koppen's classification refers to dry climates where the potential for evaporation exceeds the actual precipitation received. Unlike other groups that are defined primarily by temperature thresholds, 'B' climates are determined by the water balance. These regions, which include deserts and steppes, are identified by their moisture deficit. The classification considers the seasonal distribution of rainfall to accurately define the boundaries of these arid and semi-arid zones.

39. (D) Potential Evapotranspiration (PET)
Thornthwaite's classification system is centered on the concept of potential evapotranspiration, which is the amount of water that would evaporate and transpire if moisture were always available. By comparing PET with actual precipitation, the system determines the water surplus or deficit of a region. This approach provides a more detailed understanding of the moisture regime and its influence on vegetation and soil compared to systems based purely on temperature and rainfall totals.

40. (A) Both A and R are true and R is the correct explanation of A.
In the Koppen system, the 'E' group represents polar climates where there is no true summer. These areas are defined by the fact that even the warmest month of the year has an average temperature below 10 degrees Celsius. This extreme cold prevents the growth of trees and results in landscapes dominated by tundra or permanent ice. The reason provided accurately describes the temperature criteria used to classify these high-latitude and high-altitude regions.

41. (C) No distinct dry season; precipitation throughout the year
In Koppen's classification, lowercase letters are used to describe the seasonal distribution of precipitation. The letter 'f' stands for "feucht," the German word for moist, and indicates that the climate has no distinct dry season. This means that precipitation is distributed relatively evenly throughout the year. For example, 'Af' refers to a tropical rainforest climate, while 'Cf' refers to a humid temperate climate, both characterized by year-round rainfall.

42. (A) D Climates
The 'D' group in Koppen's classification represents cold snow forest climates, also known as continental climates. These regions have at least one month with an average temperature above 10 degrees Celsius and the coldest month below -3 degrees Celsius. They are typically found in the interior of large northern continents. These climates experience significant seasonal temperature variations and are characterized by extensive coniferous forests, which are adapted to the long, cold winters.

43. (D) It is a purely empirical classification based on observed vegetation.
Thornthwaite's classification is actually considered a more rational or process-oriented system rather than a purely empirical one like

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Koppen's. It relies on mathematical indices such as the Precipitation Effectiveness (P/E) index and the concept of water balance using potential evapotranspiration. While it relates to vegetation, its primary focus is on the physical processes of the hydrological cycle. The claim that it is purely empirical based only on observed vegetation is therefore inaccurate.

44. (B) Unusual warming of the surface waters in the eastern tropical Pacific Ocean.
El Nino is a climate pattern that involves the periodic warming of sea surface temperatures in the central and eastern tropical Pacific Ocean. This warming disrupts the normal atmospheric circulation, leading to significant changes in weather patterns worldwide. During an El Nino event, the usual upwelling of cold water near the South American coast is suppressed. This phenomenon typically occurs every two to seven years and can last for several months.

45. (C) The see-saw pattern of atmospheric pressure between the eastern and western Pacific.
The Southern Oscillation is the atmospheric component of the ENSO phenomenon. It describes the periodic reversal of surface air pressure between the eastern and western tropical Pacific. When pressure is high in the eastern Pacific, it tends to be low in the western Pacific, and vice versa. This pressure see-saw is closely linked to the warming and cooling of ocean waters, directly influencing the strength and direction of the trade winds.

46. (D) Heavier than average rainfall in Australia and Indonesia.
La Nina is characterized by cooler-than-average sea surface temperatures in the eastern Pacific and stronger-than-normal trade winds. These intensified winds push warm surface water toward the western Pacific. As a result, regions like Australia and Indonesia experience increased convection and significantly heavier rainfall, often leading to floods. Conversely, the eastern Pacific, including the coasts of Peru and Chile, tends to be even drier than usual during a La Nina event.

47. (A) 2, 3, 5, 1, 4
The life cycle of a temperate cyclone begins with the formation of a stationary front between contrasting air masses. A wave-like disturbance then develops, leading to the creation of distinct cold and warm sectors as the cold front moves faster. Eventually, the cold front overtakes the warm front, causing an occlusion where the warm air is lifted. Finally, the energy is dissipated, and the system weakens until it completely disappears.

48. (A) Both Statement I and Statement II are correct.
During El Nino, the warming of the eastern Pacific reduces the pressure gradient across the ocean, causing the Walker Circulation to weaken or even reverse. In contrast, La Nina represents a period where the normal conditions—strong trade winds and cold water in the east—are significantly enhanced. Both statements accurately describe how these phases deviate from or reinforce the standard atmospheric and oceanic circulation patterns observed in the tropical Pacific region.

49. (B) Tornado
A tornado is a violently rotating column of air that extends from a cumulonimbus cloud to the ground. They are the most intense of all atmospheric storms, characterized by extremely high wind speeds and a narrow path of destruction. While they are often associated with larger storm systems like supercell thunderstorms, their defining feature is the direct contact between the rotating vortex and the Earth's surface, which distinguishes them from other cyclones.

50. (A) Drought
A drought is a weather-related hazard characterized by a significant and prolonged deficiency in precipitation compared to the statistical multi-year average for a region. This lack of rainfall leads to water shortages that can affect agriculture, ecosystems, and human activities. Unlike sudden events like floods, droughts develop slowly over time. Their severity is determined by the duration of the moisture deficit and the resulting impact on local water resources and soil moisture.

51. (B) 1, 3 and 4
Thunderstorms are indeed fueled by the energy in cumulonimbus clouds. Hailstorms form when strong updrafts carry water droplets into freezing altitudes within these storms. Cloudbursts

NODIA

are defined by intense, localized rainfall over a short period. However, statement two is incorrect because there is no single worldwide standard for defining a heat wave; thresholds vary significantly depending on the local climate and what is considered "abnormally hot" for a specific region.

52. (D) High-mountain environments with retreating glaciers.
A Glacial Lake Outburst Flood (GLOF) occurs when a dam containing a glacial lake fails, leading to a sudden and catastrophic release of water. These dams are often made of loose glacial debris called moraines. As global temperatures rise and glaciers retreat, these lakes grow in size and number, increasing the risk of outbursts. They are a significant hazard in mountain ranges like the Himalayas and the Andes, threatening downstream communities and infrastructure.

53. (C) Milankovitch cycles
Milankovitch cycles refer to long-term variations in the Earth's orbit, tilt, and wobble, which occur over tens of thousands of years due to gravitational interactions in the solar system. These are entirely natural processes and have been the primary drivers of past ice ages. In contrast, activities like burning fossil fuels, deforestation, and industrial emissions are direct results of human actions that alter the concentration of greenhouse gases in the atmosphere.

54. (B) Global warming
Greenhouse gases, such as carbon dioxide and methane, have the ability to trap outgoing longwave radiation emitted by the Earth's surface. As the concentration of these gases increases due to human activities, more heat is retained within the atmosphere, leading to a gradual rise in the planet's average surface temperature. This phenomenon, known as global warming, is the primary driver of modern climate change and its associated environmental impacts across the world.

55. (D) Analysis of ice cores from Antarctica and Greenland.
Ice cores drilled from deep within glaciers in Antarctica and Greenland provide a remarkable record of past climates. These cores contain trapped air bubbles that preserve samples of the atmosphere from thousands of years ago, allowing scientists to measure past concentrations of greenhouse gases. Additionally, the chemical composition of the ice itself provides data on historical temperatures. This evidence is much more reliable for understanding long-term climate shifts than short-term weather records.

56. (A) Both A and R are true and R is the correct explanation of A.
Forests act as significant carbon sinks because trees absorb carbon dioxide from the atmosphere during photosynthesis to produce energy and grow. When large areas of forest are cleared, this natural absorption process is reduced. Furthermore, if the cleared wood is burned or left to decay, the carbon stored in the trees is released back into the atmosphere as carbon dioxide. Thus, deforestation both removes a cooling mechanism and adds a warming gas.

57. (C) The boundary between the troposphere and the stratosphere.
The tropopause is the transitional boundary layer that separates the troposphere from the stratosphere. It is characterized by the point where the normal decrease in temperature with altitude stops. Above this boundary, in the stratosphere, temperatures typically remain constant or begin to increase. The height of the tropopause varies by latitude, being highest near the equator and lowest near the poles, and it acts as a lid on most weather systems.

58. (A) 21%
Oxygen is the second most abundant gas in the Earth's atmosphere, making up approximately twenty-one percent of its total volume. It is essential for the respiration of almost all living organisms and is also involved in various chemical processes, such as combustion. The remaining volume of the atmosphere consists primarily of nitrogen, which accounts for seventy-eight percent, with trace amounts of argon, carbon dioxide, and other gases making up the final one percent.

59. (A) Both Statement I and Statement II are correct.
The mesosphere is the coldest layer of the atmosphere, with temperatures reaching as low as minus ninety degrees Celsius. In the thermosphere, while the kinetic energy of

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individual molecules is very high—translating to high temperatures—the air is so thin that there are very few molecules to transfer heat to an object. Consequently, an astronaut or instrument in the thermosphere would not feel "hot" in the traditional sense, as there is very little heat density.

60. (B) The Greenhouse effect
The greenhouse effect is a natural process where certain gases in the atmosphere, such as water vapour and carbon dioxide, absorb longwave radiation emitted by the Earth's surface. This trapped energy is then re-radiated in all directions, including back toward the surface, keeping the planet significantly warmer than it would be otherwise. While this process is essential for maintaining life-sustaining temperatures, human-induced increases in these gases are currently enhancing the effect and causing global warming.

61. (A) P-4, Q-2, R-3, S-1
Nitrogen is the most abundant gas in the atmosphere, providing structural volume and being largely inert. Oxygen is vital for the survival of aerobic life through the process of respiration. Carbon dioxide is a significant greenhouse gas that helps regulate the Earth's temperature by trapping heat. Ozone, found mainly in the stratosphere, plays a critical role in filtering out harmful ultraviolet radiation from the sun, protecting life on the Earth's surface.

62. (D) A rapid drop in temperature within 24 hours.
A cold wave is a weather phenomenon marked by a sudden and significant cooling of the air over a large area. It is typically defined by a rapid drop in temperature within a twenty-four-hour period to a level that requires special precautions for agriculture, industry, and human health. These events are often caused by the arrival of a cold air mass from higher latitudes and can be accompanied by strong winds that increase the wind chill factor.

63. (A) Radiational cooling of the ground at night
The most common type of temperature inversion occurs on clear, calm nights. Under these conditions, the Earth's surface loses heat rapidly through longwave radiation into space. The air in direct contact with the ground cools quickly by conduction, becoming colder than the air above it. This results in a stable layer where cold air is trapped beneath warmer air, reversing the normal lapse rate. This process is most effective during long winter nights.

64. (B) 1, 2, 3, and 4
The Hadley cell is a direct circulation driven by equatorial heating. The Westerlies are surface winds that move toward the poles from subtropical highs. The Polar cell is also thermally direct, caused by cooling at the poles. The Ferrel cell is indirect because it is forced by the motion of the other two cells. However, statement five is false because the ITCZ is actually a low-pressure zone characterized by ascending, moist air and frequent storms.

65. (B) Isobars
Isobars are lines drawn on a weather map that connect locations having the same atmospheric pressure at a specific time. They are crucial for identifying high and low-pressure systems and for determining the strength and direction of winds. When isobars are closely spaced, it indicates a steep pressure gradient and strong winds. Conversely, widely spaced isobars represent a gentle pressure gradient and light winds. These maps are fundamental tools in modern meteorological forecasting.

66. (A) Occluded Front
An occluded front forms during the final stages of a mid-latitude cyclone's life cycle. Because cold fronts generally move faster than warm fronts, the advancing cold air eventually catches up with the warm front. This process squeezes the warm air upward, lifting it completely off the ground. The resulting boundary exists between two cold air masses, with the warm air trapped aloft. Occluded fronts are usually associated with complex weather patterns and significant precipitation.

67. (C) Water Vapour
Unlike permanent gases like nitrogen, oxygen, and argon, whose proportions remain constant, water vapour is a variable gas. Its concentration can range from nearly zero percent in cold, dry desert regions to as much as four percent in warm, humid tropical areas. Because water vapour is the source of all clouds and precipitation and is

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also a powerful greenhouse gas, its variability is a primary driver of weather and climate variations across the globe.

68. (D) Temperature decreases with altitude.
In the troposphere, the air temperature generally drops as one moves higher. This phenomenon is known as the normal lapse rate, which averages about 6.5 degrees Celsius for every 1,000 meters of ascent. This cooling occurs because the atmosphere is less dense at higher altitudes and is primarily heated from below by the Earth's surface. Understanding this rate is essential for predicting weather conditions, cloud formation, and the behavior of rising air parcels.

69. (D) Statement I is incorrect but Statement II is correct.
While the Earth's heat budget is balanced as a whole, it is not balanced at every individual latitude. The tropical regions receive more solar energy than they radiate back to space, resulting in a net radiation surplus. Conversely, the polar regions radiate more energy than they receive, leading to a net deficit. This imbalance creates a temperature gradient that drives the global circulation of the atmosphere and oceans, which works to redistribute heat toward the poles.

70. (B) A freshly fallen snowfield
Albedo is the measure of how much solar radiation a surface reflects. Freshly fallen snow has one of the highest albedos of any natural surface on Earth, reflecting up to eighty or ninety percent of incoming sunlight. In contrast, dark surfaces like asphalt roads, dense forests, and deep ocean waters have low albedo, meaning they absorb most of the solar energy that hits them. This high reflectivity of snow is why polar regions remain so cold.

71. (B) Both A and R are true but R is not the correct explanation of A.
It is a factual observation that temperate cyclones usually cover a much larger geographical area compared to tropical cyclones. It is also true that temperate cyclones form along the polar front over both land and sea, while tropical cyclones require warm water to develop. However, the ability to form over land does not inherently explain why temperate cyclones are larger; their size is more related to the broad scale of the air mass boundaries involved.

72. (A) Upper-air convergence
Air subsides or sinks when there is an accumulation of air in the upper levels of the atmosphere, a process known as upper-air convergence. This extra mass of air is forced downward toward the surface. As the air sinks, it undergoes adiabatic warming and its relative humidity decreases, which typically leads to clear skies and stable weather conditions. This process is a key feature of high-pressure systems, such as the subtropical high-pressure belts.

73. (C) Cold and moist
The designation 'mP' stands for maritime Polar. The 'm' indicates that the air mass originated over an ocean, making it moist or humid. The 'P' indicates that it formed in a high-latitude polar region, making it cold. These air masses typically bring cool, damp, and cloudy weather to coastal regions when they move inland. They are common in the North Atlantic and North Pacific oceans, often influencing the weather of North America and Europe.

74. (D) 1, 2, 3, and 4
In the Northern Hemisphere, cyclones are low-pressure systems where winds converge and rotate counter-clockwise, causing rising air and stormy weather. Anticyclones are high-pressure systems where winds diverge and rotate clockwise, causing air to sink and resulting in clear, stable skies. All four statements accurately describe the fundamental pressure, wind, and weather characteristics associated with these two primary types of atmospheric circulation systems across the globe.

75. (A) 3, 1, 4, 2
The Earth's atmosphere is composed of several gases in varying proportions. Nitrogen is the most abundant, making up about 78 percent of the volume. Oxygen follows at approximately 21 percent. Argon is the most common trace gas at nearly 0.93 percent. Carbon dioxide, while critically important for the climate, exists in much smaller amounts, currently around 0.04 percent. This sequence accurately reflects the permanent and major components of the air we breathe.

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76. (B) Tahiti and Darwin
The Southern Oscillation Index (SOI) is a measure used to determine the phase of the ENSO cycle. It is calculated based on the difference in surface air pressure between Tahiti, in the central Pacific, and Darwin, in northern Australia. A negative SOI typically indicates an El Nino event, characterized by lower pressure in the east and higher pressure in the west. A positive SOI indicates a La Nina event, reflecting an intensification of the normal pressure gradient.

77. (C) A dry summer
In the Koppen climate classification system, the code 'Cs' refers to a Mediterranean climate. The 'C' stands for a warm temperate climate, and the 's' indicates a "sommertrocken" or dry summer season. These regions are unique because they receive most of their precipitation during the mild winter months, while the summers are characterized by hot, dry conditions. This climate is typically found on the western coasts of continents between thirty and forty-five degrees latitude.

78. (D) Variations in the Earth's orbit and axial tilt.
The Milankovitch theory proposes that long-term changes in the Earth's climate, specifically the onset of ice ages, are driven by cyclical variations in the planet's orbit and orientation. These include changes in the shape of the orbit (eccentricity), the degree of axial tilt (obliquity), and the direction the axis points (precession). These cycles alter the seasonal and latitudinal distribution of solar energy reaching the Earth, triggering feedback loops that lead to large-scale glaciation.

79. (A) Cold front
These observations are classic indicators of an approaching cold front. Because cold air is denser, it forcefully pushes under the warm air, causing rapid vertical lifting. This process creates low pressure at the surface and leads to the development of tall cumulonimbus clouds, which are associated with heavy rain and thunderstorms. As the front passes, the wind speed increases and shifts direction, and the temperature drops sharply, signaling the arrival of the colder air mass.

80. (B) It absorbs harmful ultraviolet (UV) radiation from the sun.
The ozone layer, located primarily in the stratosphere, performs a vital function for life on Earth by absorbing the majority of the sun's high-energy ultraviolet radiation. This absorption prevents these harmful rays from reaching the surface, where they could cause DNA damage, skin cancer, and harm to ecosystems. Additionally, the energy absorbed by ozone is converted into heat, which is responsible for the characteristic temperature increase with height in the stratospheric layer.

81. (B) P-3, Q-4, R-1, S-2
Cyclones are powerful low-pressure systems characterized by strong, rotating winds. Droughts represent severe water scarcity resulting from a long-term lack of precipitation. GLOFs are sudden, destructive floods caused by the failure of natural dams holding back glacial lakes. Heat waves involve prolonged periods of abnormally high temperatures that exceed local safety thresholds. Each of these hazards has distinct physical drivers and impacts on the environment and human populations in different geographic regions.

82. (A) Westerlies
Local winds are small-scale wind systems that are driven by regional topography or local temperature differences, such as the Loo in India, the Fohn in the Alps, and the Chinook in the Rockies. In contrast, the Westerlies are a type of planetary or prevailing wind. They are part of the global atmospheric circulation, blowing consistently from the subtropical high-pressure belts toward the sub-polar low-pressure belts in both the Northern and Southern Hemispheres.

83. (C) Converging trade winds and convection
The Inter-Tropical Convergence Zone (ITCZ) is a belt of low pressure located near the equator where the trade winds from the Northern and Southern Hemispheres meet. This convergence forces the warm, moist air to rise through intense convection, leading to frequent thunderstorms and heavy rainfall. The ITCZ is not a fixed line but shifts north and south with the seasons following the sun's zenith, significantly influencing tropical weather patterns and monsoon systems worldwide.

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84. (A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
Anticyclones are high-pressure systems where the air is sinking from higher altitudes toward the surface. As this air descends, it is compressed and warms adiabatically. This warming increases the air's capacity to hold water vapour, which lowers its relative humidity and causes existing clouds to evaporate. Therefore, the process described in the second statement provides the direct physical explanation for why anticyclones are almost always associated with clear skies and settled, fair weather.

85. (C) The development of land and sea breezes
Land and sea breezes are local wind patterns caused by the different rates at which land and water absorb and release heat. During the day, land heats up faster than the adjacent sea, creating lower pressure over land and drawing in a cool sea breeze. At night, the land cools more quickly, resulting in higher pressure over land and a breeze blowing toward the sea. This daily cycle is a classic example of small-scale atmospheric circulation.

86. (B) Two air masses are in contact but neither is advancing.
A stationary front represents a state of equilibrium where a cold air mass and a warm air mass meet, but neither has enough force to displace the other. On a weather map, this is shown by a line with alternating blue triangles and red semi-circles pointing in opposite directions. While the front itself does not move much, the interaction between the two air masses along the boundary can still produce clouds and prolonged periods of light precipitation.

87. (D) The annual range of temperature is highest in the continental interiors of mid-latitudes.
Continental interiors in the middle latitudes experience the highest annual temperature ranges because land surfaces heat up and cool down much faster than oceans. Without the moderating influence of large bodies of water, these regions face extremely hot summers and very cold winters. Coastal areas have much smaller temperature ranges due to the high specific heat of water. Similarly, cloudy and humid areas have smaller daily ranges because moisture traps heat and reflects sunlight.

88. (A) Subtropical High
The horse latitudes are two belts of high atmospheric pressure located at approximately thirty degrees north and south of the equator. These regions are characterized by calm winds and clear skies because they are zones where air from the Hadley and Ferrel cells subsides. Historically, sailors were often becalmed in these areas for long periods. The high pressure and sinking air in these latitudes are also responsible for the world's major subtropical desert regions.

89. (B) 2, 3 and 5
Anthropogenic factors are those driven by human activity. These include the emission of greenhouse gases from industrial processes, the removal of forests which reduces carbon sequestration, and changes in land use like urbanization which creates heat islands. In contrast, Milankovitch cycles and volcanic eruptions are natural phenomena that have influenced the Earth's climate for millions of years. Distinguishing between these sources is essential for understanding modern climate trends and developing effective mitigation strategies.

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90. (A) Pressure changes between the eastern and western Pacific
The Southern Oscillation describes the periodic fluctuation in sea-level air pressure across the tropical Pacific Ocean. It is measured by the pressure difference between the eastern Pacific (near Tahiti) and the western Pacific (near Darwin, Australia). This atmospheric see-saw is the twin component of the oceanic El Nino phenomenon. Together, they form the ENSO cycle, which is one of the most significant drivers of global climate variability on an interannual time scale.

91. (A) Both A and R are true and R is the correct explanation of A.
Many of the world's major deserts, such as the Atacama and the Namib, are located on the western coasts of continents in the subtropics. These regions sit under the descending branch of the Hadley cell, where sinking air inhibits rainfall. Additionally, cold ocean currents along

these coasts cool the lower atmosphere, creating a stable inversion that further prevents convection. The combination of high pressure and cold water creates the hyper-arid conditions characteristic of these coastal deserts.

92. (B) The longwave radiation emitted by the Earth's surface.
After the Earth's surface absorbs shortwave solar radiation, it heats up and re-emits energy in the form of longwave, or infrared, radiation. This process is called terrestrial radiation. Unlike solar radiation, which easily passes through the atmosphere, terrestrial radiation is efficiently absorbed by greenhouse gases like water vapour and carbon dioxide. This absorption is the primary mechanism that heats the atmosphere from the bottom up, maintaining the temperatures necessary for life on Earth.

93. (C) Thermosphere (Ionosphere)
The ionosphere is a region within the thermosphere where solar radiation is so intense that it strips electrons from gas molecules, creating a layer of electrically charged particles called ions. These ions have the unique property of reflecting certain radio waves back to Earth, enabling long-distance wireless communication. This layer also interacts with the solar wind to produce auroras. Its density and effectiveness change between day and night due to varying solar exposure.

94. (D) Northeast to Southwest
Trade winds are permanent winds that blow from the subtropical high-pressure belts toward the equatorial low-pressure trough. In the Northern Hemisphere, the pressure gradient force moves the air southward, while the Coriolis force deflects it to the right. This results in a prevailing wind that blows from the northeast toward the southwest. These winds are remarkably steady and were historically used by sailing ships to cross the oceans for global trade and exploration.

95. (A) The aridity or humidity of a region based on water balance.
Thornthwaite's moisture index is a key component of his 1948 climatic classification system. It is calculated by comparing the amount of precipitation a region receives with its potential evapotranspiration. This index effectively measures the balance between water supply and water demand. A positive index indicates a humid climate with a moisture surplus, while a negative index indicates an arid or semi-arid climate with a moisture deficit, allowing for a precise categorization of moisture regimes.

96. (B) Tornado
Tornadoes are capable of producing the highest wind speeds recorded on Earth, sometimes exceeding three hundred miles per hour. While tropical cyclones are much larger and can cause more total damage over a broader region, a tornado concentrates immense energy into a very small area, often just a few hundred meters wide. This extreme concentration of power makes tornadoes the most destructive meteorological events in terms of localized wind force and pressure changes.

97. (A) Both Statement I and Statement II are correct.
A Glacial Lake Outburst Flood is a high-magnitude, low-frequency event that can release millions of cubic meters of water in a very short time. Such events are often triggered when the natural moraine dam, which is structurally weak, is breached by an external event like an earthquake or an ice avalanche into the lake. Both statements correctly highlight the severe impact of these floods and the physical mechanisms that can lead to the sudden dam failure.

98. (A) Temperature
The first level of Koppen's climate classification is based on broad temperature characteristics, with the exception of the 'B' group. 'A' represents tropical rainy climates, 'C' represents warm temperate climates, 'D' represents cold snowy forest climates, and 'E' represents polar climates. These categories are defined by specific temperature thresholds for the warmest and coldest months. This approach reflects the fundamental role that temperature plays in determining the types of vegetation and ecosystems that thrive in a given region.

99. (C) Persistent, calm, clear skies
Thunderstorms are intense convective events characterized by lightning, thunder, and heavy precipitation, including rain or hail. They are driven by strong updrafts and downdrafts within cumulonimbus clouds, which also generate

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turbulent winds. Persistent calm and clear skies are the exact opposite of the conditions found in a thunderstorm; such stable weather is instead characteristic of high-pressure systems or anticyclones where air is subsiding and preventing the vertical development of clouds and storms.

100. (D) Warm Front
A warm front occurs when a mass of relatively warm, moist air moves into an area occupied by colder air. Because the warm air is less dense, it cannot easily displace the heavier cold air. Instead, it gently glides upward along the sloping boundary of the cold air mass. This gradual ascent leads to the formation of widespread clouds, such as nimbostratus, and typically results in long periods of light to moderate precipitation over a large area.

101. (B) Tropical Cyclone
The description provided matches the specific characteristics of a tropical cyclone. These storms must form over warm tropical waters to gain energy from latent heat. They cannot form at the equator because the Coriolis force is too weak to create the necessary rotation. A well-defined 'eye' is a hallmark of a mature, intense tropical cyclone. These features distinguish them from temperate cyclones, which are frontal systems, and tornadoes, which are much smaller and more localized.

102. (A) The polar front jet stream is located over the sub-polar low-pressure belt.
The polar front jet stream is a narrow band of strong winds in the upper troposphere located above the region where cold polar air meets warmer mid-latitude air. This boundary corresponds with the sub-polar low-pressure belt at the surface. Jet streams are not surface winds; they are high-altitude phenomena that generally flow in a meandering, wave-like pattern from west to east. Their path and intensity are governed by the temperature contrast between the contrasting air masses.

103. (A) P-2, Q-4, R-1, S-3
'Af' stands for a tropical rainforest climate, which is hot and wet year-round. 'BWh' represents a hot desert climate, where evaporation significantly exceeds precipitation. 'Csa' denotes a Mediterranean climate with wet winters and dry summers. 'ET' refers to a Tundra climate, where the warmest month is below ten degrees Celsius. These codes provide a standardized way to describe and compare the diverse climates found across the planet's surface.

104. (D) Tropical cyclones
Tropical cyclones derive their immense power from the latent heat of condensation. As warm, moist air rises from the tropical ocean, the water vapour condenses into liquid droplets. This phase change releases a vast amount of energy into the surrounding air, causing it to warm further and rise even faster. This feedback loop intensifies the low-pressure system and drives the high wind speeds characteristic of these storms. Without a continuous supply of moist air, the cyclone would weaken.

105. (A) 2, 3, 1, 4
The onset of an El Nino event begins when the trade winds weaken or reverse. This allows the warm water that usually pools in the western Pacific to flow eastward toward South America. As this warm water accumulates in the eastern Pacific, the thermocline—the boundary between warm and cold water—deepens. Finally, this deep layer of warm water prevents the usual upwelling of cold, nutrient-rich water off the Peruvian coast, disrupting the marine ecosystem and local weather.

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106. (D) Warm ocean currents, leading to milder and wetter conditions.
Most east coasts in the mid-latitudes, such as the eastern United States or Japan, are influenced by warm ocean currents flowing from the tropics toward the poles. These currents, like the Gulf Stream or Kuroshio, warm the overlying air and provide a significant source of moisture. This results in climates that are generally milder in winter and receive more precipitation than continental interiors at the same latitude. These regions often experience high humidity during the summer months.

107. (A) Warming of the central and eastern tropical Pacific.
The transition between the two phases of the ENSO cycle is marked by a fundamental change in ocean temperatures. During La Nina, the central

and eastern Pacific are cooler than normal. As the cycle shifts toward El Nino, these regions begin to warm significantly. This warming is accompanied by a weakening of the trade winds and a drop in the Southern Oscillation Index, representing a reversal of the intensified normal conditions that characterize the La Nina phase.

108. (A) Both A and R are true and R is the correct explanation of A.
A cloudburst is an extreme rainfall event where a huge amount of water is dumped in a very short time. This often happens in mountainous regions because the topography forces warm, moist air to rise rapidly—a process called orographic lift. This rapid ascent causes quick cooling and massive condensation within a localized, stationary cloud system. The steep terrain then concentrates the resulting runoff into narrow valleys, often leading to devastating flash floods and landslides.

109. (B) Oxygen (O_2)
Greenhouse gases are those that can absorb and emit infrared radiation, trapping heat in the atmosphere. The primary ones include carbon dioxide, methane, nitrous oxide, and water vapour. Oxygen, although essential for life and the second most abundant gas in the atmosphere, does not have the molecular structure required to absorb longwave radiation effectively. Therefore, it does not contribute to the greenhouse effect or global warming, unlike the trace gases mentioned in the other options.

110. (B) It is a thermally indirect cell, acting like a gear between the Hadley and Polar cells.
The Ferrel Cell is unique in the tricellular model because it is not driven directly by solar heating or polar cooling. Instead, it is a thermally indirect cell that is forced into motion by the activity of the adjacent Hadley and Polar cells. It functions like a mechanical gear, moving air between thirty and sixty degrees latitude. Because it is an indirect cell, the air within it sinks where it is relatively warm and rises where it is cool.

111. (D) 1, 2, 3, and 4
Atmospheric stability is determined by comparing how quickly a rising air parcel cools versus the temperature of the surrounding environment. An unstable atmosphere exists when a rising parcel remains warmer than its surroundings, encouraging it to continue rising. A stable atmosphere resists this movement. A temperature inversion, where air gets warmer with height, is the most stable condition possible because it prevents any vertical mixing. All four statements accurately reflect these fundamental principles of meteorology.

112. (B) Cold wave
A cold wave is a weather event characterized by a sharp and rapid decrease in air temperature over a short period, usually twenty-four hours. These events are often caused by the movement of large, cold air masses from polar regions into lower latitudes. Cold waves can have significant impacts on human health, energy consumption, and agriculture, especially when accompanied by strong winds or freezing temperatures. They represent a significant departure from the normal expected weather for a given season.

113. (C) cP (continental Polar)
Air masses originating over large landmasses like Siberia during the winter are classified as continental Polar (cP). The 'c' indicates a continental source region, which means the air is very dry. The 'P' indicates a polar region, meaning the air is extremely cold. When these air masses move southward, they bring clear, frigid, and dry weather. They are responsible for some of the coldest temperatures recorded in the Northern Hemisphere outside of the polar ice caps.

114. (B) Isotherms
Isotherms are lines on a map that connect points experiencing the same temperature. By drawing these lines, meteorologists can visualize patterns such as temperature gradients, the location of warm and cold air masses, and the influence of oceans or mountains on regional climates. Isotherms are the standard tool for showing horizontal temperature distribution. In contrast, isobars show pressure, isohyets show rainfall, and isonifs are used to show the distribution of snow or frozen precipitation.

115. (B) Both Statement I and Statement II are incorrect.
Both statements are fundamentally incorrect because they swap the roles of the two primary forces affecting wind. It is the Pressure Gradient Force (PGF) that initiates the movement of air

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and determines its initial direction from high to low pressure. The Coriolis force, on the other hand, is responsible for the deflection of that moving air to the right or left. Neither force acts in the manner described in the statements, showing a misunderstanding of basic atmospheric dynamics.

116. (C) Cold Snow Forest Climates
In the Koppen system, the 'D' group designates cold snow forest climates, often found in the interiors and eastern coasts of large northern continents. These climates are characterized by severe winters where the temperature of the coldest month is below minus three degrees Celsius, and at least one summer month averages above ten degrees Celsius. This temperature range supports the growth of extensive boreal or taiga forests, which are a defining feature of these high-latitude regions.

117. (C) The increase of methane from agriculture and landfills.
While natural cycles like El Nino or volcanic eruptions affect the climate, the increase of methane is a direct result of human activities. Rice cultivation, livestock farming, and the decomposition of waste in landfills are significant sources of methane, which is a potent greenhouse gas. This increase alters the global energy balance by trapping more heat in the atmosphere. This is a clear example of how human civilization is actively changing the Earth's long-term climatic conditions.

118. (B) The accumulation of supercooled water droplets on an ice particle within a strong thunderstorm updraft.
Hailstones form within large cumulonimbus clouds during intense thunderstorms. Strong updrafts carry small ice pellets upward through layers of the cloud containing supercooled water droplets. These droplets freeze onto the ice pellet on contact, adding layers. The hailstone may cycle up and down several times within the storm as long as the updraft is strong enough to support its weight. Once it becomes too heavy, it falls to the Earth as a hailstone.

119. (D) Daily temperature readings from the last five years
To study past climate change, scientists look for records that span decades, centuries, or millennia. Pollen analysis, tree rings, and ice cores provide indirect data about environmental conditions from the distant past. In contrast, daily temperature readings from just the last five years are considered short-term weather data. While they show current trends, they do not provide the long-term historical perspective necessary to identify significant shifts in the Earth's climate over geological or historical time scales.

120. (B) P-4, Q-1, R-2, S-3
An isobar connects points of equal atmospheric pressure, vital for mapping wind patterns. An isotherm connects points of equal temperature. The ITCZ is the equatorial trough where trade winds converge, creating a permanent low-pressure zone. Albedo is a measure of the reflectivity of a surface, such as how much sunlight is reflected by snow. Together, these terms represent fundamental concepts in the study of atmospheric science and global weather patterns.

121. (A) Both A and R are true and R is the correct explanation of A.
Tropical cyclones require a rotational force to organize the converging winds into a spinning vortex. This rotation is provided by the Coriolis force, which is an effect of the Earth's rotation. Because the Coriolis force is proportional to the sine of the latitude, it is mathematically zero at the equator. Without this force to initiate the spin, the air simply flows directly into the low-pressure center, preventing the development of a structured, rotating cyclone system.

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122. (B) Calm or very light and variable winds.
The Doldrums, located in the equatorial region within the ITCZ, are characterized by low atmospheric pressure and weak pressure gradients. Because the air here is primarily rising due to intense solar heating rather than moving horizontally, surface winds are often non-existent or very light and unpredictable. Historically, this was a dreaded region for sailors in wind-powered ships, as they could be stranded for weeks waiting for enough wind to move their vessels across the equator.

123. (C) Walker Circulation

The Walker Circulation is the name given to the large-scale atmospheric circulation pattern in the tropical Pacific. It involves the east-west movement of air driven by the temperature difference between the warm western Pacific and the cool eastern Pacific. Because changes in the strength and direction of this circulation are fundamental to the development of El Nino and La Nina events, the Walker Circulation is considered the primary atmospheric component of the broader ENSO climate cycle.

124. (B) It forms when a cold front catches up with and overtakes a warm front.
An occluded front represents the mature and final stage of a mid-latitude cyclone. It occurs because the cold front, which moves more rapidly, eventually catches up with the slower-moving warm front ahead of it. As the two fronts merge, the warm air mass that was between them is forced upward, losing contact with the ground. This process creates a complex boundary that usually brings mixed precipitation and precedes the eventual dissipation of the entire storm system.

125. (A) 2, 3, 4, and 5
The stratosphere contains the ozone layer, and the mesosphere is where most meteors burn up upon entry. The thermosphere experiences the highest temperatures, and the troposphere is the layer where almost all weather occurs. However, statement one is incorrect because the troposphere is actually thickest at the equator—up to eighteen kilometers—due to intense heating and convection, and thinnest at the poles, where it may only be eight kilometers deep because of the cold, dense air.

126. (B) Tropical cyclones are driven by latent heat, while temperate cyclones are driven by the temperature contrast between air masses.
Tropical cyclones are "warm-core" systems that gain energy from the latent heat released during the condensation of water vapour over warm oceans. They do not have fronts. In contrast, temperate cyclones are "cold-core" systems that develop along the polar front due to the sharp temperature and density differences between cold polar air and warm subtropical air. This horizontal temperature gradient provides the potential energy that drives the circulation and development of these mid-latitude storm systems.

127. (B) Stratosphere
The stratosphere is the atmospheric layer located above the troposphere, extending from about twelve to fifty kilometers in altitude. Its most distinctive feature is that temperature increases with height, a phenomenon caused by the presence of the ozone layer. Ozone molecules absorb high-energy ultraviolet radiation from the sun and convert it into heat. This temperature inversion makes the stratosphere very stable, preventing the vertical mixing and weather activity that characterize the layer below it.

128. (A) The horizontal transfer of heat or other atmospheric properties.
In meteorology, advection refers specifically to the transport of atmospheric properties, such as heat, moisture, or pollutants, by the horizontal movement of air. This is a major process for redistributing energy across the globe, especially in the mid-latitudes where air masses frequently move from one region to another. While convection describes vertical transport, advection is responsible for the large-scale movement of warm air toward the poles and cold air toward the equator via wind systems.

129. (A) Both Statement I and Statement II are correct.
During a La Nina event, the normal pressure gradient across the Pacific is intensified, resulting in trade winds that are much stronger than average. These winds push more warm water to the west and cause intense upwelling of cold water in the east. The resulting cold sea surface temperatures off the coast of South America inhibit convection and rainfall, frequently leading to severe drought conditions in countries like Peru and Chile. Both statements accurately describe these effects.

130. (A) Flash flood originating from a glacial lake.
A Glacial Lake Outburst Flood (GLOF) is a specific type of flash flood that occurs when a natural dam holding a lake of glacial meltwater suddenly fails. These events are characterized by their sudden onset and the enormous volume of water and debris they can release in a short time. They are distinct from slow-moving seasonal floods because they are catastrophic,

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unpredictable events triggered by physical dam failure rather than just heavy rainfall or gradual snowmelt.

131. (C) 3, 1, 2
A thunderstorm progresses through three distinct stages. It begins with the cumulus stage, characterized by strong updrafts that build the cloud vertically. Next is the mature stage, where both updrafts and downdrafts are present, and the storm reaches its peak intensity with heavy rain and lightning. Finally, the dissipating stage occurs when the downdrafts dominate, cutting off the supply of warm, moist air and causing the storm to weaken and eventually fade away.

132. (C) Thornthwaite
C.W. Thornthwaite introduced a climatic classification system that relies heavily on Potential Evapotranspiration (PET). He defined PET as the amount of moisture that would be evaporated from the soil and transpired by plants if water were not a limiting factor. By using PET alongside actual precipitation, Thornthwaite developed a more complex and physically-based method for determining a region's water balance and moisture index, which he argued was a better reflection of climate than simple temperature averages.

133. (C) Divergence of air at the surface
An anticyclone is a high-pressure system where air is sinking toward the Earth's surface. When this sinking air reaches the ground, it is forced to move horizontally away from the center of high pressure, a process known as divergence. Because the air is sinking and warming, it suppresses cloud formation and precipitation. This is why anticyclones are almost always associated with clear, calm weather, in contrast to the converging and rising air found in low-pressure cyclones.

134. (D) Heat transfer from low to high latitudes occurs solely through ocean currents.
While it is true that the overall heat budget is balanced and that there is a surplus in the tropics and a deficit at the poles, the claim that heat is transferred toward the poles solely through ocean currents is incorrect. In reality, both the atmospheric circulation (winds) and oceanic circulation (currents) work together to redistribute energy. Winds actually account for the majority of this heat transport, moving significantly more energy than ocean currents do on a global scale.

135. (B) Precipitation being less than potential evapotranspiration.
The 'B' group in Koppen's system is unique because it is the only major category defined by moisture levels rather than temperature. These are dry climates where the potential for water to evaporate and transpire from plants exceeds the actual amount of rainfall received. This moisture deficit is the defining characteristic of deserts and semi-arid steppes. To identify these climates, Koppen used formulas that considered the relationship between annual temperature and the seasonal distribution of precipitation.

136. (B) 1, 2 and 3
Cold fronts are steep and cause rapid lifting, leading to intense storms. Warm fronts have a gentle slope, causing gradual ascent and widespread, steady rain. An occluded front represents the mature peak of a cyclone before it begins to weaken. However, the fourth statement is incorrect; while weather clears after a cold front, the passage of a warm front usually results in continued cloudy skies and a transition to warmer, more humid conditions rather than immediate clearing.

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137. (B) The Southern Hemisphere
These terms are used to describe the powerful and consistent westerly winds found between forty and sixty degrees latitude in the Southern Hemisphere. Because there are very few large landmasses in these latitudes to provide friction and break up the wind, the westerlies blow much stronger and more reliably than in the Northern Hemisphere. These winds were famously named by sailors who had to navigate these stormy and turbulent southern oceans during the age of sail.

138. (B) The unequal distribution of solar radiation between the equator and the poles.
The primary engine driving the Earth's atmospheric circulation is the temperature difference between the warm equator and the cold poles. This temperature gradient is caused by the unequal distribution of solar radiation across different latitudes. The atmosphere responds to this imbalance by creating large-scale circulation

cells—the Hadley, Ferrel, and Polar cells—that work to transport surplus heat from the tropics toward the poles. This process is the fundamental cause of the planet's major wind and pressure systems.

139. (B) A jet stream
Jet streams are narrow bands of extremely fast-moving air in the upper atmosphere that flow from west to east. A pilot flying in the same direction can enter a jet stream to significantly increase the aircraft's ground speed without using extra engine power. This reduces travel time and saves a substantial amount of fuel. Conversely, pilots flying from east to west try to avoid jet streams, as the strong headwind would slow them down and increase fuel consumption.

140. (A) Both A and R are true and R is the correct explanation of A.
Urban areas are typically warmer than the surrounding countryside because city surfaces like asphalt and concrete are very efficient at absorbing solar energy. These materials have a low albedo, meaning they reflect little sunlight, and a high thermal capacity, meaning they store a lot of heat during the day. This stored energy is then released slowly at night. Additionally, the lack of vegetation in cities reduces cooling through evapotranspiration, further intensifying the temperature difference known as the heat island.

141. (A) P-2, Q-1, R-3, S-4
The Fohn is a warm wind that descends the leeward side of the Alps. The Loo is a hot summer wind blowing across the northern plains of India. The Chinook affects the leeward side of the Rocky Mountains. The Mistral is a cold wind blowing down the Rhone Valley in France. These winds are all examples of how local geography significantly influences regional weather and climate patterns.

142. (B) Earth's rotation
The rotation of the Earth on its axis is the fundamental cause of the Coriolis effect, which deflects moving air and water. As the Earth spins, points at different latitudes move at different speeds. This results in an apparent force that turns moving objects to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This deflection is critical for the formation of the large-scale gyres in the oceans and the prevailing wind belts in the atmosphere.

143. (C) Anthropogenic greenhouse gas emissions
While human-induced greenhouse gas emissions are the primary cause of current global warming, they were not a factor in past climate changes, such as the ice ages or the Medieval Warm Period. Those historical shifts were driven by natural factors like volcanic activity, variations in solar output, and changes in the Earth's orbital parameters. It is only since the Industrial Revolution that anthropogenic emissions have become a dominant force in altering the Earth's long-term climate system.

144. (A) A very sudden and heavy downpour of rain, often in a mountainous area.
A cloudburst is an extreme meteorological event where a vast amount of precipitation falls over a small area in a very short time, typically exceeding one hundred millimeters per hour. These events are most common in mountainous regions where steep terrain can cause rapid upward movement of moist air, triggering intense convective activity. Because they occur so quickly and with such volume, cloudbursts frequently result in devastating flash floods, debris flows, and significant loss of life and property.

145. (A) Both Statement I and Statement II are correct.
Scientific records show that atmospheric carbon dioxide levels have risen from about two hundred eighty parts per million before the Industrial Revolution to over four hundred parts per million today. This unprecedented increase is primarily driven by human activities, specifically the combustion of coal, oil, and gas for energy and transportation. Deforestation also plays a major role by releasing stored carbon and reducing the planet's capacity to absorb CO_2. Both statements correctly identify this critical environmental trend.

146. (B) The land heats up faster than the sea, creating a local low pressure over land.
During the day, the sun heats both the land and the sea. However, land has a lower specific heat than water, meaning it heats up much more quickly. As the air above the land warms, it expands and rises, creating a localized area of

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low pressure. The cooler air over the sea, which is at a higher pressure, then flows toward the land to fill the void. This results in the refreshing cool breeze that coastal residents experience during the afternoon.

147. (C) Their source region's temperature and moisture characteristics.
Air masses are classified based on the environment in which they form, known as their source region. A source region must be a large, uniform area where air can remain stagnant long enough to take on the characteristics of the surface below. The two primary criteria used are the latitude of the source (polar or tropical), which determines temperature, and the type of surface (maritime or continental), which determines moisture content. This classification helps meteorologists predict weather changes.

148. (B) Occlusion
Occlusion is a unique and defining stage in the development of a temperate cyclone. It occurs when the faster-moving cold front overtakes the slower warm front, lifting the warm air mass entirely off the ground. This process signals that the cyclone has reached its maximum intensity and is beginning to dissipate. Unlike tropical cyclones, which are fueled by warm water and lack fronts, temperate cyclones are fundamentally defined by these frontal interactions and the eventual process of occlusion.

149. (A) 1, 2, and 4
Tornado intensity is indeed measured using the Fujita (or Enhanced Fujita) scale based on damage. Tropical cyclones in the Atlantic and Northeast Pacific are specifically referred to as hurricanes. Hailstorms require the strong updrafts found in cumulonimbus clouds to keep ice particles suspended. However, statement three is incorrect; cold waves are not exclusive to high latitudes and can occur in mid-latitude and even subtropical regions when polar air masses surge unusually far toward the equator.

150. (B) The global energy balance
Climate scientists study human impact on the planet by analyzing how activities like burning fossil fuels and deforestation alter the Earth's energy balance. By increasing the concentration of greenhouse gases, humans are causing the atmosphere to trap more outgoing longwave radiation, leading to a net gain in energy within the Earth system. This imbalance is the root cause of global warming. This approach focuses on the physical mechanisms of heat retention rather than natural orbital or geological cycles.

151. (B) Tropical Monsoon
In the Koppen system, 'A' stands for a tropical climate where all months are warm. The lowercase 'm' specifically stands for monsoon. A 'Am' climate is characterized by heavy annual rainfall but has a short dry season that is not severe enough to prevent the growth of tropical rainforests. This climate is typical of regions that experience seasonal wind reversals, such as parts of India, Southeast Asia, and Western Africa, where the monsoon brings intense seasonal precipitation.

152. (B) To transfer surplus heat from the tropics to the poles.
Because the Earth is a sphere, the tropics receive more solar energy than they lose, while the polar regions lose more energy than they receive. To prevent the equator from getting hotter and the poles from getting colder indefinitely, the Earth's atmosphere and oceans act as a massive heat redistribution system. Winds and ocean currents continuously carry this surplus heat toward the higher latitudes. This constant movement is what drives the global climate and maintains the planet's overall temperature stability.

153. (A) Both A and R are true and R is the correct explanation of A.
The stratosphere is an extremely stable layer because its temperature profile is the opposite of the troposphere. Since ozone absorption causes temperatures to rise with height, the warmer, less dense air is already at the top, while cooler, denser air is at the bottom. This prevents the vertical overturning or convection that causes weather. This lack of vertical mixing is why volcanic ash or pollutants that reach the stratosphere can remain there for several years, affecting global climate.

154. (C) A prolonged period with a significant deficit in water supply.
A drought is not just a few days without rain; it is a long-term deficiency in the water supply relative to the normal conditions of a specific area. It

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can be caused by a lack of precipitation, but its severity is also influenced by high evaporation rates and human water demand. Droughts are complex hazards that can be categorized as meteorological, agricultural, or hydrological, depending on whether the deficit is measured in rainfall, soil moisture, or stream and reservoir levels.

155. (B) The proportions of permanent gases like nitrogen and oxygen remain remarkably constant up to about 90 km.
The atmosphere is remarkably well-mixed in its lower layers. The proportions of major permanent gases—78 percent nitrogen, 21 percent oxygen, and nearly 1 percent argon—remain virtually constant from the surface up to an altitude of about eighty to ninety kilometers, a region known as the homosphere. Above this height, the gases begin to separate by their atomic weight. This consistency is essential for maintaining the stable atmospheric conditions required for most biological and chemical processes on the Earth.

156. (A) 2, 4, 1, 3
The process leading to a Glacial Lake Outburst Flood begins with the formation and growth of a lake behind a natural moraine dam as a glacier melts. Next, a trigger event, such as an earthquake, an avalanche into the lake, or extreme water pressure, occurs. This event causes the structurally weak moraine dam to fail or be overtopped. Finally, the sudden breach leads to a catastrophic flash flood that surges down the valley, carrying water, ice, and debris.

157. (B) The ENSO cycle
The Walker Circulation is the name given to the large-scale atmospheric circulation pattern in the tropical Pacific. It involves the east-west movement of air driven by the temperature difference between the warm western Pacific and the cool eastern Pacific. Because changes in the strength and direction of this circulation are fundamental to the development of El Nino and La Nina events, the Walker Circulation is considered the primary atmospheric component of the broader ENSO climate cycle.

158. (B) Calm winds and clear skies
A radiation inversion is most likely to form when conditions allow the ground to lose heat rapidly. Clear skies are necessary because clouds would trap outgoing terrestrial radiation and reflect it back to the surface. Calm winds are essential because strong winds would mix the air, preventing a distinct cold layer from forming at the surface. Therefore, a still, cloudless night provides the perfect environment for the air near the ground to become much colder than the air just above it.

159. (A) 1, 4, and 5
Koppen's system is empirical because it uses observable data like temperature and rainfall to define categories. Thornthwaite's system is more process-oriented, utilizing potential evapotranspiration to calculate the water balance of a region. Both systems are fundamental tools in geography. However, statement two is inaccurate because Thornthwaite's system is not purely genetic; and statement three is wrong because Koppen's 'B' climates are defined by moisture deficiency, not by specific temperature thresholds like the other groups.

160. (A) P-3, Q-1, R-2
The Hadley cell, located near the equator, produces the Trade Winds as air returns to the ITCZ. The Ferrel cell in the mid-latitudes is associated with the prevailing Westerlies. The Polar cell at the highest latitudes generates the Polar Easterlies as cold air moves away from the polar highs. This relationship between the three vertical circulation cells and the resulting surface wind belts forms the basis of the global atmospheric circulation model used in modern meteorology.

161. (B) The temperature exceeding locally-defined thresholds for a certain number of consecutive days.
A heat wave is a relative term that depends on the typical climate of a region. What is considered a heat wave in London would be a normal summer day in New Delhi. Therefore, meteorologists define a heat wave as a period where the daily maximum temperature exceeds a specific, locally-relevant threshold for several consecutive days. This definition accounts for the fact that human populations and ecosystems are adapted to their local environment and suffer when temperatures significantly deviate from the norm.

162. (A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
Air pressure is the weight of the atmosphere pressing down on a surface. Because gravity pulls air molecules toward the Earth, the density of the air is highest at the surface and decreases as you go higher. Since there are fewer air molecules above you at higher altitudes, the total weight or pressure of the air column decreases. Thus, the second statement about gravity and density provides the fundamental physical reason for the pressure-altitude relationship described in the first statement.

163. (D) Changes in the Sun's energy output (solar cycles).
Milankovitch cycles refer specifically to the variations in the Earth's position and orientation in space relative to the sun. These include eccentricity (orbital shape), obliquity (axial tilt), and precession (axial wobble). While these cycles change how much solar energy different parts of the Earth receive, they do not involve changes in the actual amount of energy the sun produces. Solar cycles, such as the eleven-year sunspot cycle, are a separate phenomenon related to the sun's internal magnetic activity.

164. (C) Coriolis Force
The Coriolis force is an apparent force that results from the Earth's rotation. It acts perpendicular to the direction of motion, meaning it can only change the path an object takes, not its velocity. In the Northern Hemisphere, it deflects moving air to the right, and in the Southern Hemisphere, to the left. This is different from the pressure gradient force, which can change both speed and direction, or the frictional force, which primarily acts to slow the wind down.

165. (B) Polar Front Theory
The Polar Front Theory, developed by the Bergen School of meteorology, provides the standard model for how mid-latitude or temperate cyclones form, grow, and eventually decay. It describes the process beginning with a stationary front where cold and warm air masses meet, followed by the development of a wave, the creation of distinct fronts, the process of occlusion, and the final dissipation. This theory is essential for understanding the weather patterns that dominate the middle latitudes of the Earth.

166. (C) It causes increased upwelling of cold water off the coast of Peru.
During a normal year, strong trade winds push warm surface water away from the South American coast, allowing cold, nutrient-rich water to rise from below—a process called upwelling. However, during an El Nino event, the trade winds weaken. This allows warm water to remain or even flow back toward the coast of Peru, which effectively suppresses the upwelling of cold water. This lack of nutrients has a devastating impact on local fisheries and significantly alters the regional climate and weather.

167. (B) Hot summer
In the Koppen classification, the third letter provides more detail about the summer or winter temperatures. The letter 'a' specifically indicates a "hot summer," where the warmest month has an average temperature above twenty-two degrees Celsius. Therefore, a 'Cfa' climate—like that of the southeastern United States or eastern China—is a humid subtropical climate characterized by mild winters, rainfall throughout the year, and summers that are both hot and humid, supporting a wide variety of vegetation.

168. (D) 1, 2, 3, and 4
The passage of a cold front is one of the most distinct weather events. As the denser cold air arrives, the temperature drops rapidly, and the wind shifts direction, often from southwesterly to northwesterly. The forceful lifting of warm air creates a narrow band of intense rain or thunderstorms. After the front passes, the sky clears quickly, and the atmospheric pressure rises as the colder, heavier air mass settles in. All four statements accurately describe these characteristic changes.

169. (B) Solar radiation
The sun is the ultimate source of energy for nearly all processes in the Earth's atmosphere. Incoming solar radiation, or insolation, heats the surface and the air, driving the temperature gradients that create pressure differences. These differences, in turn, generate winds and the global

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atmospheric circulation. While geothermal heat and tidal forces exist, their contribution to the Earth's atmospheric energy budget is negligible compared to the massive and constant influx of electromagnetic energy provided by the sun.

170. (B) The rapid change in altitude, aspect, and slope creates a mosaic of microclimates.
Mountainous regions do not have a single uniform climate. Instead, they are characterized by a complex mosaic of microclimates. This is because temperature and pressure change rapidly with altitude. Furthermore, the direction a slope faces (aspect) determines how much sunlight it receives, and the steepness of the slope affects drainage and soil moisture. These factors create vastly different environmental conditions over very short horizontal distances, making highland climates unique and highly variable compared to flat lowland areas.

171. (B) Warm, dry summers and mild, wet winters.
A Mediterranean climate is one of the most distinctive in the Koppen system. It is characterized by a seasonal cycle where the summers are dominated by subtropical high pressure, leading to hot, sunny, and very dry conditions. In contrast, during the winter, the pressure belts shift, allowing mid-latitude cyclones to bring mild temperatures and most of the region's annual rainfall. This climate is typical of coastal California, central Chile, the Mediterranean basin, and parts of southwestern Australia.

172. (A) Both A and R are true and R is the correct explanation of A.
La Nina is often described as the "cool phase" of the ENSO cycle, but it is more accurately an intensification of the normal Pacific climate. Usually, the eastern Pacific is cool and the trade winds blow westward. During La Nina, the trade winds become exceptionally strong, pushing even more warm water to the west and causing the upwelling of cold water in the east to become even more intense. This strengthens the existing temperature and pressure gradients, confirming both the assertion and its explanation.

173. (C) Polar Front
The polar front is the global-scale boundary where the cold, dense air of the Polar cell meets the warmer, less dense air of the Ferrel cell. This zone of sharp temperature and pressure contrast is located at approximately sixty degrees latitude. The interaction between these two contrasting air masses along the polar front is the primary birthplace of temperate or extra-tropical cyclones. It is also the region where the polar front jet stream is located in the upper atmosphere.

174. (D) Strengthening of the Pacific trade winds
A fundamental characteristic of an El Nino event is the weakening or even the reversal of the Pacific trade winds. These winds normally blow from east to west, but when the pressure gradient across the Pacific breaks down during El Nino, the winds lose their strength. This weakening is what allows warm surface water to migrate toward the eastern Pacific, leading to other consequences like drought in Australia and increased rainfall in Peru. Therefore, strengthening trade winds is incorrect.

175. (A) P-4, Q-1, R-2, S-3
'A' climates are tropical and winterless, with every month being warm. 'B' climates are defined by aridity, where evaporation exceeds precipitation. 'C' climates are warm temperate with mild winters. 'D' climates are continental with severe winters and cold snow forests. This classification system provides a logical framework for understanding the Earth's major climate zones based on the relationship between temperature, precipitation, and the resulting vegetation patterns found across different latitudes and continents.

176. (B) Condensation
Dew forms when the temperature of a surface, like grass or a car roof, drops below the dew point of the surrounding air. When this happens, the air in direct contact with the surface can no longer hold its water vapour, which then changes from a gas into liquid water droplets. This process is called condensation. It typically occurs on clear, calm nights when the ground loses heat rapidly through radiation, cooling the objects on its surface to very low temperatures.

177. (C) Statement I is correct but Statement II is incorrect.
An anticyclone is indeed a system characterized by high atmospheric pressure at its center.

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However, the second statement is wrong regarding the direction of wind circulation. Due to the Coriolis effect, winds in a high-pressure system in the Northern Hemisphere always circulate in a clockwise direction as they move outward from the center. Counter-clockwise circulation in the Northern Hemisphere is a characteristic of low-pressure systems, known as cyclones. Therefore, only the first statement is factually accurate.

178. (B) Saturation
Saturation is the state of the atmosphere when the air contains the maximum possible amount of water vapour for a given temperature. At this point, the rate of evaporation equals the rate of condensation. If more water vapour is added or the temperature drops, the excess vapour will condense into liquid water. The temperature at which a specific parcel of air reaches saturation is known as the dew point. Relative humidity at saturation is always one hundred percent.

179. (B) The emission of carbon dioxide from burning fossil fuels.
While several human activities contribute to climate change, the largest and most significant impact comes from the release of carbon dioxide into the atmosphere. This occurs primarily through the combustion of fossil fuels—coal, oil, and natural gas—for electricity, transportation, and industrial processes. Because carbon dioxide is a long-lived greenhouse gas that effectively traps heat, its rising concentration since the Industrial Revolution is the main driver of the observed increase in global average temperatures.

180. (A) 1, 2, 3, and 5
El Nino and La Nina represent the warm and cold oceanic phases, while the Southern Oscillation describes the linked atmospheric pressure changes. The normal state of the Pacific involves a strong Walker Circulation with low pressure in the west. However, statement four is incorrect because ENSO is fundamentally a coupled ocean-atmosphere phenomenon; it cannot occur without the interaction between changing sea surface temperatures and the resulting shifts in atmospheric pressure and wind patterns across the tropical Pacific.

181. (B) Conditions are favorable for the formation of tornadoes in the area.
In meteorological terminology, a "watch" is different from a "warning." A Tornado Watch is issued over a broad area when the atmospheric conditions—such as high instability, moisture, and wind shear—are conducive to the development of tornadoes. It serves as a notice for people to remain alert and be prepared to take action. A Tornado Warning, however, is issued when a tornado has actually been sighted or indicated by radar, requiring immediate protective measures to be taken.

182. (D) mT (maritime Tropical)
The classification 'mT' stands for maritime Tropical. The 'm' indicates that the air mass formed over an ocean, which provides a vast source of moisture, making the air very humid. The 'T' indicates it originated in low-latitude tropical regions where solar heating is intense, making the air very warm. These air masses are unstable and are responsible for the hot, humid weather and frequent thunderstorms experienced in many coastal and tropical regions during the summer.

183. (C) Heat transfer via atmosphere and oceans
The Earth's spherical shape leads to a radiation surplus at the equator and a deficit at the poles. If this were not corrected, the tropics would eventually boil and the poles would freeze solid. To maintain the planet's temperature stability, a massive amount of heat is constantly transported from low to high latitudes. This transfer is carried out by the global wind systems (atmospheric circulation) and the great ocean currents, which act as a planetary heating and cooling system.

184. (C) ET
In the Koppen system, the 'E' group represents polar climates. The symbol 'ET' specifically designates the Tundra climate. This climate is defined by having its warmest month with an average temperature between zero and ten degrees Celsius. This is warm enough for some snow to melt and for hardy vegetation like mosses and lichens to grow, but too cold to support trees. It is found along the northern fringes of North America, Eurasia, and certain high-altitude regions.

185. (A) Both A and R are true and R is the correct explanation of A.

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Mountains exhibit extreme climatic diversity within relatively small areas. This variety is primarily caused by the rapid change in altitude, which directly affects air temperature and pressure. Additionally, the orientation of a mountain slope (aspect) determines the amount of solar radiation it receives, and the steepness of the slope influences water runoff and vegetation. Because these factors change with every ridge and valley, mountains naturally host a wide range of distinct local climates and ecosystems.

186. (B) The absorption of solar UV radiation by ozone
In most of the atmosphere, temperature decreases with height. However, the stratosphere is different because it contains a high concentration of ozone. Ozone molecules are highly efficient at absorbing ultraviolet radiation from the sun. As they absorb this high-energy radiation, they convert it into thermal energy, which heats the surrounding air. Because the absorption is most intense in the upper parts of the ozone layer, the temperature increases as you go higher into the stratosphere.

187. (C) Dissipation or weakening of a front.
Frontolysis is the meteorological term for the process where the temperature and density differences between two air masses decrease, leading to the gradual weakening or complete disappearance of the front that separates them. This can happen if the air masses move over a uniform surface or if they are mixed by strong winds. The opposite process, where the contrast between air masses increases and a front forms or intensifies, is known as frontogenesis.

188. (B) Earthquake
Meteorological hazards are those caused by atmospheric processes and extreme weather events, such as hailstorms, heat waves, tornadoes, and cyclones. An earthquake, however, is a geological or tectonic hazard. It is caused by the sudden release of energy in the Earth's crust, resulting from the movement of tectonic plates or volcanic activity. While earthquakes can trigger secondary hazards like tsunamis or landslides, they are not driven by atmospheric conditions or weather patterns like meteorological hazards are.

189. (A) Both Statement I and Statement II are correct.
The Pressure Gradient Force (PGF) is the fundamental force that initiates all wind movement. It arises from differences in atmospheric pressure between two locations. The force always acts directly from the area of higher pressure toward the area of lower pressure. On a weather map, this direction is perpendicular to the isobars. The closer the isobars are to each other, the stronger the pressure gradient and the more powerful the resulting wind will be.

190. (B) Thornthwaite's system is based on potential evapotranspiration and water balance, making it more process-oriented.
While Koppen's system is widely used because it relies on easily measured temperature and precipitation data, Thornthwaite argued that these alone do not accurately define a climate's moisture regime. His system is more "rational" because it incorporates potential evapotranspiration to calculate the actual water balance of a region. This approach considers not just how much water falls, but how much is needed by the environment, making it a more sophisticated tool for studying hydrology and agricultural potential.

191. (B) Anticyclone
The characteristics listed—high-pressure center, diverging surface winds, and subsiding air—are the defining features of an anticyclone. In these systems, air from the upper atmosphere is sinking toward the surface. As it sinks, it warms adiabatically and its relative humidity drops, which prevents the formation of clouds. This is why anticyclones are almost always associated with calm winds, clear skies, and settled weather, serving as the opposite of the stormy conditions found in low-pressure cyclones.

192. (B) Methane
Methane is a very powerful greenhouse gas, with a much higher heat-trapping capability per molecule than carbon dioxide over a short time frame. Human activities have significantly increased its atmospheric concentration. Key sources include the decomposition of organic matter in flooded rice paddies and the digestive processes of ruminant livestock like cows and sheep, known as enteric fermentation. As global demand for these agricultural products

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has grown, so too have the methane emissions contributing to global warming.

193. (A) P-3, Q-4, R-1, S-2
Conduction is the transfer of heat through direct contact between molecules. Convection involves the vertical movement of air as it is heated and becomes less dense. Insolation is the shortwave radiation arriving from the sun. Terrestrial radiation is the longwave energy emitted by the Earth after warming. These four processes are the fundamental mechanisms through which energy enters, moves within, and eventually leaves the Earth's complex and integrated atmospheric system.

194. (C) Descending air and general atmospheric stability.
Located at about thirty degrees north and south of the equator, the subtropical high-pressure belts are zones where air that rose at the equator finally descends. This sinking air is compressed and warmed, which inhibits the formation of clouds and precipitation. This results in very stable atmospheric conditions and calm winds. Because of this persistent high pressure and lack of moisture, most of the world's largest deserts are located within these latitudinal belts across both hemispheres.

195. (B) Thunderstorm
Cumulonimbus clouds, colloquially known as thunderheads, are the only type of clouds capable of producing lightning and thunder. They are formed by intense vertical convection of warm, moist air. For a pilot, these clouds represent a major hazard due to the violent internal updrafts and downdrafts that cause severe turbulence. The presence of lightning and the rapid vertical development of the clouds are definitive characteristics of an active thunderstorm, distinguishing it from other more stable weather systems.

196. (B) Atmospheric stability
Atmospheric stability is a measure of the atmosphere's tendency to either resist or encourage vertical air motion. It is determined by comparing the cooling rate of a rising air parcel (adiabatic lapse rate) with the temperature of the surrounding stationary air (environmental lapse rate). If the parcel remains warmer than its surroundings, it is buoyant and will continue to rise, indicating an unstable atmosphere. If it becomes cooler, it will sink, indicating a stable atmospheric condition.

197. (A) 2, 4, and 5
Tropical cyclones are intense low-pressure systems that derive their energy from the latent heat released when water vapour condenses. They require the Coriolis force to create their characteristic spin. However, statement one is wrong because they form exclusively over warm oceans, and statement three is wrong because they are "warm-core" systems that lack the frontal structures found in temperate cyclones. These storms are unified convective systems rather than boundaries between different air masses.

198. (C) Inter-Tropical Convergence Zone (ITCZ)
The Doldrums is a historical maritime term for the region near the equator where the trade winds of the Northern and Southern Hemispheres meet. Meteorologically, this area is called the Inter-Tropical Convergence Zone (ITCZ). It is a persistent belt of low pressure characterized by rising air, high humidity, and frequent convective activity. The term "Doldrums" specifically highlights the calm and erratic winds often found at the surface in this zone, which once posed a challenge for sailing ships.

199. (B) Melting Arctic sea ice reduces Earth's albedo, causing more solar absorption and further melting.
A positive feedback loop is a process that amplifies the original change. When Arctic sea ice melts due to warming, it reveals the dark ocean water underneath. Because water has a much lower albedo than ice, it absorbs significantly more solar radiation, which warms the ocean further. This additional heat then causes even more ice to melt, accelerating the warming process. This self-reinforcing cycle is a major concern for scientists studying the rapid pace of climate change.

200. (A) Both A and R are true and R is the correct explanation of A.
In the troposphere, the temperature generally drops as you go higher. This is because the atmosphere is primarily heated by the Earth's surface rather than directly by the sun. As you

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move away from the surface, there are fewer air molecules and less pressure, which means the air is less effective at absorbing and retaining heat. The decrease in air density and the increasing distance from the primary heat source combine to create the normal lapse rate.

201. (B) Troposphere
Gravity pulls the atmosphere toward the Earth's surface, concentrating the vast majority of its mass in the lowest layer. The troposphere contains approximately eighty percent of the total mass of the atmosphere. Because the weight of all the air above presses down on this bottom layer, the gas molecules are packed more tightly together than in any other layer. As altitude increases through the stratosphere, mesosphere, and thermosphere, the density of gas molecules drops off exponentially.

202. (C) Statement I is correct but Statement II is incorrect.
The Westerlies are indeed the prevailing winds of the mid-latitudes, blowing from west to east in both hemispheres. However, the second statement is incorrect because the Westerlies actually originate from the subtropical high-pressure belts (horse latitudes) and blow toward the sub-polar low-pressure belts. Wind always moves from areas of high pressure to areas of low pressure. Therefore, their source is the high-pressure zone, while the sub-polar low is their destination.

203. (A) The tilt of the Earth's rotational axis.
The Earth's axis is tilted at an angle of 23.5 degrees relative to its orbital plane. As the Earth orbits the sun, this tilt causes different hemispheres to receive varying amounts of solar radiation at different times of the year. When a hemisphere is tilted toward the sun, it experiences summer due to more direct rays and longer days. This tilt is the fundamental cause of the seasons, rather than the slightly varying distance between the Earth and the sun.

204. (A) P-2, Q-4, R-1, S-3
On weather maps, a cold front is shown by a blue line with triangles. A warm front is a red line with semi-circles. A stationary front is shown by alternating blue triangles and red semi-circles on opposite sides. An occluded front is a purple line with triangles and semi-circles on the same side. These standardized symbols allow meteorologists to quickly identify different types of frontal boundaries and predict approaching regional weather changes.

205. (C) Cloudburst
A cloudburst is a specific type of extreme rainfall event that occurs when a huge volume of water is released over a very small geographic area in a short amount of time. It is driven by powerful convective currents within a massive cloud, such as a cumulonimbus. While a monsoon is a seasonal wind pattern and a drizzle is light rain, a cloudburst is a sudden, catastrophic deluge that can cause immediate and severe flash flooding.

206. (D) 1, 2, 3 and 4
Scientists use several "proxy" records to reconstruct past climates. Tree rings show annual growth rates affected by temperature and moisture. Ice cores contain trapped air bubbles that preserve ancient atmospheric composition. Ocean sediments contain the remains of microorganisms that reflect past water temperatures. Pollen analysis identifies the types of plants that lived in an area, indicating historical climate conditions. Together, these four sources provide a comprehensive picture of how the Earth's climate has shifted over thousands of years.

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207. (B) A warm, dry wind that will rapidly melt snow.
The Chinook is a local wind that occurs on the eastern, or leeward, side of the Rocky Mountains in North America. It is a type of Fohn wind that warms and dries as it descends the mountain slopes. Chinooks can cause temperatures to rise by twenty degrees Celsius or more in just a few hours. Because the wind is so warm and dry, it can rapidly evaporate and melt heavy snow cover, earning it the nickname "snow eater."

208. (C) Insolation
Insolation is a portmanteau of "incoming solar radiation." It describes the total amount of solar energy that reaches a specific area of the Earth's surface in a given time. This energy arrives as shortwave electromagnetic radiation. The amount of insolation received is the primary factor determining local temperatures and driving the Earth's climate and weather

systems. It varies significantly depending on the latitude, the season, the time of day, and the local atmospheric conditions.

209. (A) Both Statement I and Statement II are correct. These statements accurately describe the three-dimensional structure of pressure systems. In an anticyclone (high pressure), air converges in the upper atmosphere and is forced downward, causing it to diverge at the surface. In a cyclone (low pressure), air converges at the surface and is forced upward, leading to divergence in the upper atmosphere. This vertical movement and the resulting surface wind patterns are essential for maintaining the mass balance of the atmosphere and driving different weather conditions.

210. (A) Generally from west to east.
Temperate cyclones in the middle latitudes are steered by the prevailing Westerlies and the polar front jet stream, both of which flow from west to east. Consequently, these storm systems typically form or enter from the western part of the continent and move across toward the Atlantic coast. This eastward movement is the reason why weather patterns in North America and Europe often move from west to east, allowing forecasters to track storms as they travel.

211. (A) Temperature and Precipitation
Wladimir Koppen developed his climate classification system based on the idea that native vegetation is the best expression of climate. Therefore, he chose temperature and precipitation as his two primary variables, as these are the two most important factors for plant growth. By using monthly and annual averages of these two elements, he created a standardized system of letters and codes that could categorize the diverse climates found anywhere on the Earth's surface.

212. (B) El Nino / La Nina
ENSO stands for El Nino-Southern Oscillation, which is a single climate phenomenon consisting of two interconnected parts. The Southern Oscillation is the atmospheric component, referring to the "see-saw" of air pressure across the Pacific. El Nino and La Nina are the oceanic components, referring specifically to the periodic warming or cooling of sea surface temperatures in the central and eastern tropical Pacific. The atmosphere and the ocean are tightly coupled, each influencing the behavior of the other.

213. (B) 2, 3, 4, 1
The atmosphere is organized into layers starting from the Earth's surface. The troposphere is the first layer, extending up to about thirteen kilometers. Above it is the stratosphere, which contains the ozone layer. The third layer is the mesosphere, extending to about eighty kilometers. Finally, the thermosphere is the outermost major layer, where the air is very thin. This sequence—troposphere, stratosphere, mesosphere, and thermosphere—is defined by the different temperature trends found within each distinct region.

NODIA

214. (A) Land Breeze - Differential heating of land and sea
A land breeze is a local wind that blows from the land toward the sea at night. It is caused by the differential heating and cooling of land and water. Because land loses heat faster than water, the air over the land becomes cooler and denser (higher pressure) than the air over the sea. The other options are incorrect: the Coriolis effect is caused by Earth's rotation, tropical cyclones are driven by latent heat, and temperature inversions represent atmospheric stability.

215. (B) Potential evapotranspiration and precipitation
Thornthwaite's 1948 classification system was designed to provide a more detailed understanding of a region's moisture regime. Instead of just looking at total rainfall, he introduced the concept of Potential Evapotranspiration (PET)—the amount of water that would be lost to the atmosphere if moisture were always available. By comparing PET with the actual precipitation, his system determines the moisture index, which indicates whether a region has a water surplus or deficit, providing a better measure of climatic aridity.

216. (A) 1, 2, 3, and 4
Atmospheric pressure is the weight of the air column and is measured using a barometer. Standard sea-level pressure is about 1013.25 millibars. Cold air is indeed denser and usually exerts more pressure. However, statement five is completely incorrect because pressure always decreases with altitude, not increases. As you go

higher into the atmosphere, there is less air above you, so the weight and resulting pressure of the air column inevitably drop as you ascend.

217. (B) Left (Buys Ballot's Law)
Buys Ballot's Law states that in the Northern Hemisphere, if a person stands with their back to the wind, the area of lower atmospheric pressure will be to their left. This is due to the way the Coriolis force deflects the wind as it moves from high to low pressure. In the Southern Hemisphere, the law is reversed, and the low pressure would be to the person's right. This rule is a practical way to determine the location of nearby storm systems.

218. (A) Sinking air, light winds, and often clear skies.
The eye is the remarkably calm center of a powerful tropical cyclone. Within the eye, air from the upper atmosphere is subsiding or sinking. This sinking motion causes the air to warm and dry out, which suppresses cloud formation and leads to light winds and often clear, sunny skies. This is in stark contrast to the eyewall, located just outside the eye, which contains the most violent winds and heaviest rainfall found in the entire storm system.

219. (C) Fog
Precipitation refers to any form of water, liquid or solid, that falls from the atmosphere and reaches the Earth's surface, such as rain, snow, and hail. Fog, however, is a suspension of tiny water droplets in the air near the ground. It is essentially a cloud that has formed at the surface. While fog can be very damp, it does not "fall" from the sky in the same way that rain or snow does, classifying it as a condensation product.

220. (A) Both A and R are true and R is the correct explanation of A.
Water vapour is a variable gas whose concentration in the atmosphere varies significantly from place to place and time to time. This variability exists because the sources of water vapour—evaporation from oceans and transpiration from plants—are highly dependent on factors like temperature, sunlight, and availability of water. In warm tropical regions, water vapour levels are high, while in cold polar or dry desert regions, they are very low. The constant recycling of water explains these fluctuations.

221. (B) P-4, Q-2, R-1, S-3
El Nino involves unusual warming of the eastern tropical Pacific. La Nina is the intensification of normal cold conditions in the same region. A temperate cyclone is a mid-latitude storm system built around cold and warm fronts. A tornado is a violently rotating column of air in contact with the ground. These four phenomena represent different scales and types of atmospheric or oceanic disturbances that significantly affect global and local weather patterns.

222. (B) Glacial Lake Outburst Flood
GLOF is the standard scientific acronym for a Glacial Lake Outburst Flood. This is a hazardous event where a dam composed of glacial ice or moraine debris fails, leading to a sudden, catastrophic release of meltwater from a lake located near or on a glacier. These floods are high-energy events that can travel long distances down mountain valleys, posing a major threat to human life and infrastructure. They are becoming more frequent in many regions due to glacial retreat.

223. (B) Tundra
In Koppen's system, 'E' denotes polar climates. The sub-category 'ET' specifically stands for the Tundra climate. This climate is identified by having its warmest month average above freezing but below ten degrees Celsius. This narrow temperature range allows for only small, hardy plants like mosses, lichens, and shrubs to grow during the short summer. It is too cold for trees to survive. The Tundra climate is found in the northern reaches of Canada, Russia, and Scandinavia.

224. (C) Statement I is correct but Statement II is incorrect.
Albedo is the measure of a surface's reflectivity, expressed as a percentage of the incoming radiation that is reflected. However, the second statement is wrong because dark surfaces like asphalt have a very low albedo, typically around five to ten percent, meaning they absorb most of the heat. In contrast, white surfaces like fresh snow have a very high albedo, often exceeding eighty percent. Therefore, a dark road has a much lower albedo than a field of snow.

225. (A) It marks the end of the general decrease in temperature with height.

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The tropopause is the transition layer between the troposphere and the stratosphere. Its most important characteristic is that it marks the altitude where air temperature stops decreasing with height. In the troposphere, air cools as it rises, but once it reaches the tropopause, the temperature stays constant or begins to rise. This boundary effectively acts as a ceiling that limits the vertical growth of most clouds and weather systems, trapping them within the lowest layer of the atmosphere.

226. (B) A persistent high-pressure system that traps warm air over a region.
A heat wave is typically caused by a slow-moving or stationary high-pressure system, often called a "heat dome." In such a system, the air sinks toward the surface, warming as it is compressed. This sinking air also prevents clouds from forming, allowing intense solar radiation to reach the ground all day. The high pressure acts like a lid, trapping the warm air over a region for an extended period, leading to temperatures that significantly exceed the local seasonal average.

227. (D) 1, 2, 3 and 4
The Hadley and Polar cells are thermally direct because they are driven by the rising of warm air and the sinking of cold air, respectively. The Ferrel cell is thermally indirect because its motion is forced by the other two cells. Together, these three cells form the tricellular model, which provides a comprehensive explanation for the location of the Earth's major pressure belts and the direction of the planetary winds like the trades and westerlies in both hemispheres.

228. (A) A high-speed river of air in the upper troposphere.
Jet streams are narrow, fast-moving bands of air located near the tropopause, usually between nine and fifteen kilometers high. They are caused by the temperature difference between contrasting air masses and the rotation of the Earth. These high-altitude "rivers" of air typically flow from west to east at speeds that can exceed two hundred miles per hour. They are essential for steering weather systems across the globe and are a key factor in long-distance aviation planning and fuel efficiency.

229. (B) Absolutely unstable
The Environmental Lapse Rate (ELR) is the actual rate at which the air temperature changes with height. The Dry Adiabatic Lapse Rate (DALR) is the rate at which a rising dry parcel of air cools. If the ELR is greater than the DALR, it means the surrounding air is cooling very quickly with height. Consequently, a rising parcel of air will remain warmer and less dense than its surroundings at all altitudes, causing it to continue rising. This state is called absolute instability.

230. (B) moist; dry
This classification refers to the moisture content of an air mass based on its source region. Maritime air masses (denoted by 'm') form over large bodies of water like oceans, allowing them to absorb a significant amount of water vapour. Continental air masses (denoted by 'c') form over large landmasses, meaning they have limited access to moisture. Therefore, maritime air is characterized as being humid or moist, while continental air is characterized as being dry. This distinction is fundamental to predicting weather.

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231. (B) The long-moving average of weather conditions for a location.
Climate is different from weather because it describes the long-term patterns and averages of the atmosphere for a specific location. While weather refers to the state of the atmosphere at a single moment—like a rainy Tuesday—climate is based on data collected over at least thirty years. It includes average temperatures, typical rainfall amounts, and the frequency of extreme events. Climate provides a broad understanding of what conditions are normal or expected for a region throughout the different seasons.

232. (B) A cold front catches up with and overtakes a warm front.
In a mid-latitude cyclone, the cold front usually moves much faster than the warm front. As the cyclone matures, the advancing cold front eventually catches up with the slower warm front. This process, known as occlusion, forces the warm air mass that was between the two fronts to be lifted completely away from the Earth's surface. The resulting boundary, called an occluded front, marks the transition to the final, dissipating stage of the storm's life cycle.

233. (D) 1, 2, 3, 4, and 5
Climate change is driven by a combination of natural and human-induced factors. Long-term orbital variations, volcanic eruptions, and sunspot cycles are all natural drivers. Plate tectonics also alters the climate over geological time by changing the positions of continents. In the modern era, anthropogenic greenhouse gas emissions have become a dominant force. All five statements correctly identify different mechanisms that influence the Earth's climate across various time scales, from a few years to millions of years.

234. (A) Latent heat
Latent heat is the energy involved in a phase change of a substance, such as water turning from a liquid to a gas (evaporation) or from a gas to a liquid (condensation). Unlike sensible heat, which you can feel and measure with a thermometer, latent heat is "hidden" because it does not change the temperature of the substance. This energy is incredibly important in the atmosphere because it is transported by water vapour and released as heat during cloud and storm formation.

235. (A) Both Statement I and Statement II are correct.
Both statements accurately identify the primary origins and drivers of the two major types of cyclonic systems. Temperate cyclones are "cold-core" systems that form at the boundary between polar and subtropical air masses, known as the polar front. Tropical cyclones are "warm-core" systems that develop as thermal lows over warm tropical waters, gaining their energy from the massive release of latent heat during convection. These fundamental differences determine the structure and behavior of each storm type.

236. (A) Perpendicular to isobars, from high to low pressure.
The pressure gradient force is the primary driver of all wind. It is created by the difference in atmospheric pressure between two areas. This force always acts in a straight line from the area of higher pressure toward the area of lower pressure. On a weather map, this direction is always perpendicular to the isobars. The magnitude of the force is determined by how quickly the pressure changes over a distance, represented by the spacing between the isobar lines.

237. (C) Exceptionally strong upwelling off the coast of Peru.
La Nina is characterized by an intensification of the normal conditions in the Pacific. During this phase, the trade winds are unusually strong, pushing warm surface water even further to the west. This results in an exceptionally strong upwelling of cold, nutrient-rich water from the deep ocean along the coast of South America, especially off Peru. This process makes the eastern Pacific even colder than normal and has a significant impact on global weather patterns and local marine ecosystems.

238. (A) BWh
In the Koppen system, the letter 'B' stands for dry climates. The 'W' stands for "Wuste" (German for desert), indicating an arid climate. The lowercase 'h' stands for "heiss" (German for hot), which means the average annual temperature is above eighteen degrees Celsius. Therefore, the code 'BWh' specifically represents a hot desert climate, such as the Sahara or the Arabian Desert, where rainfall is extremely scarce and temperatures remain high throughout the year.

239. (A) GLOF
A GLOF, or Glacial Lake Outburst Flood, is the scientific term for the sudden release of water from a lake that is dammed by glacial ice or a terminal moraine. These events are catastrophic because they happen without warning and can release enormous quantities of water, ice, and rock into a narrow valley. Unlike seasonal river floods or storm surges, GLOFs are high-velocity events that are directly related to the melting of glaciers and the instability of natural dams in high-mountain regions.

240. (B) Stratopause
The atmosphere is divided into layers separated by transitional boundaries known as "pauses." The stratopause is the boundary that marks the top of the stratosphere and the beginning of the mesosphere. It is typically located at an altitude of about fifty kilometers. At the stratopause, the temperature reaches its local maximum because of the ozone layer below. Above this point, in the mesosphere, the temperature begins to decrease again as you move further away from the ozone-heated layer.

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241. (C) A is true but R is false.
A temperature inversion is a situation where a layer of warm air sits above a layer of cold air, which is the opposite of the normal state of the atmosphere. While the first statement correctly describes this structure, the second statement is entirely false. In reality, a temperature inversion is an extremely stable condition. Because the cold, dense air is at the bottom and the warm, light air is on top, there is no natural tendency for the air to rise or mix.

242. (A) P-3, Q-4, R-1, S-2
Nitrogen is the most plentiful gas and is largely inert. Ozone, found in the stratosphere, protects life by absorbing harmful UV radiation. Water vapour is a variable gas that is the source of all precipitation. Carbon dioxide is a greenhouse gas that helps regulate the Earth's temperature. Each of these components plays a unique and essential role in maintaining the complex physical and biological systems of the planet.

243. (A) Burning of fossil fuels
While deforestation and other land-use changes contribute to the increase in atmospheric carbon dioxide, the single most significant source is the combustion of fossil fuels like coal, oil, and natural gas. These fuels are burned to generate electricity, power vehicles, and run industrial processes. This activity releases vast amounts of carbon that had been stored underground for millions of years, leading to a rapid and unprecedented rise in the concentration of CO_2 in the atmosphere since the Industrial Revolution.

244. (B) Cold and dry
The classification 'cP' stands for continental Polar. The 'c' indicates that the air mass originated over a large landmass, which means it has had little opportunity to absorb moisture and is therefore very dry. The 'P' indicates it formed in a high-latitude polar region, where there is very little solar radiation, making the air very cold. When these air masses move into middle latitudes during the winter, they typically bring clear skies, frigid temperatures, and very low humidity.

245. (C) Polar Easterlies - Warm winds originating from the poles
This pair is incorrect because the polar easterlies are some of the coldest winds on the Earth. They originate from the polar high-pressure cells located over the freezing Arctic and Antarctic regions. As the cold, dense air sinks and moves away from the poles, it is deflected by the Coriolis force, creating the easterly wind pattern. Trade winds, westerlies, and monsoons are all correctly described in the other options according to standard global and regional wind system definitions.

246. (C) Stronger-than-normal trade winds in the Pacific.
A central characteristic of the La Nina phase is the significant strengthening of the easterly trade winds across the tropical Pacific. These intensified winds are driven by an increased pressure gradient between the eastern and western Pacific. They push more warm surface water toward Indonesia and Australia and cause even more cold water to upwell along the South American coast. This makes the La Nina phase an "enhanced" version of the normal atmospheric and oceanic conditions in the region.

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247. (B) The stratosphere contains the ozone layer and experiences temperature inversion.
The stratosphere is correctly described as the layer containing the majority of the Earth's ozone. It also experiences a temperature inversion, where temperatures increase with height rather than decrease. The other options are false: temperature does not decrease consistently throughout all layers; auroras occur in the thermosphere, not the troposphere; and the thermosphere is the hottest layer, while the mesosphere is the coldest. These distinctions are fundamental to understanding the vertical structure of the atmosphere and its physical properties.

248. (A) It is based on the causes of climatic characteristics, such as water balance and PET.
Thornthwaite's 1948 classification system is considered more advanced or "rational" than Koppen's because it focuses on the physical processes that determine climate. Instead of just using temperature and rainfall as simple indicators, Thornthwaite introduced potential evapotranspiration to calculate the actual water balance of a region. By evaluating the balance between water supply and demand, his system provides a more scientifically grounded way to classify moisture regimes and their impact

It triggers a complex series of systemic changes across the entire planet. These impacts include the alteration of precipitation patterns, the melting of polar ice leading to sea-level rise, and an increase in the frequency of extreme weather events. These wide-ranging consequences fundamentally transform ecosystems and human societies.

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257. (D) An increase in global albedo would result in a net cooling effect on the planet.
Albedo measures the reflectivity of various surfaces, with higher values indicating that more solar radiation is reflected back into space without being absorbed. If the global albedo increases, the Earth absorbs less energy from the sun. This reduction in absorbed heat would lead to an overall decrease in temperatures, creating a noticeable cooling effect on the global climate system.

258. (A) The global circulation of the atmosphere and oceans.
Unequal heating creates an energy surplus at the equator and a deficit at the poles. To maintain thermal equilibrium, heat must be transported away from the tropics toward higher latitudes. This fundamental imbalance acts as the primary driver for large-scale atmospheric and oceanic circulation, facilitating the continuous movement of air and water across the surface of the planet.

259. (C) Longwave radiation.
Solar radiation reaches the Earth primarily as shortwave energy. Once the surface absorbs this radiation, it heats up and re-emits energy in the form of longwave, or infrared, radiation. This shift in wavelength is a critical aspect of the planetary energy cycle, as longwave radiation is more easily trapped by specific atmospheric gases, contributing to the natural greenhouse effect.

260. (A) Earth's magnetic field.
The amount of solar radiation reaching the surface is influenced by several geographic and atmospheric factors. These include the latitude of a location, the specific season, and the presence of cloud cover. While magnetic fields are a physical characteristic of the planet, they are not identified as a variable that determines the intensity or distribution of insolation at the surface.

261. (D) The existence of a pressure gradient between two locations.
Wind is the horizontal movement of air initiated by differences in atmospheric pressure between two distinct locations. This difference creates a pressure gradient force that pushes air from high-pressure areas toward low-pressure centers. Without this fundamental pressure imbalance, air would remain stationary, and the atmospheric circulation patterns observed across the globe would not be able to develop or persist.

262. (B) They are deflected to the right, crossing isobars at an angle towards the low-pressure area.
Surface winds are influenced by the pressure gradient force, the Coriolis force, and friction. In the Northern Hemisphere, the Coriolis effect deflects moving air to the right. When combined with the slowing effect of surface friction, the air does not flow parallel to isobars. Instead, it moves across them at an angle while spiraling toward the low-pressure center.

263. (C) Winds at the equator flow directly from high to low pressure, largely unaffected by deflection.
The Coriolis force, which is responsible for deflecting moving air, is entirely absent at the equator. Consequently, air movement in this region is primarily governed by the pressure gradient force without the influence of rotational deflection. This allows winds to flow more directly from high-pressure zones to low-pressure areas compared to the curved paths observed at higher latitudes.

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264. (D) Low pressure is linked to warm, rising air, while high pressure is associated with cold, sinking air.
Atmospheric systems are distinguished by their vertical air movement and temperature. High-pressure areas, or anticyclones, consist of cold, dense air that sinks toward the surface. In contrast, low-pressure systems, known as cyclones, are characterized by warm, lighter air that rises into the atmosphere. These contrasting physical behaviors result in different weather patterns and distinct directions of horizontal air circulation.

265. (A) Pressure gradient force and Coriolis force.
Geostrophic winds occur in the upper atmosphere where the influence of surface friction is negligible. At these high altitudes, the pressure gradient force, which initiates air movement, and the Coriolis force, which causes deflection, eventually reach a state of equilibrium. This balance forces the wind to blow in a direction that is parallel to the isobars rather than across.

on different geographical regions and their ecosystems.

249. (C) 1, 2, 3, 4, and 5
Temperate or extra-tropical cyclones are fundamentally different from tropical cyclones. They are large-scale frontal systems that develop along the polar front and gain their energy from the temperature and density contrasts between different air masses. They can form over both land and sea, usually cover a much larger area than tropical storms, and do not possess a calm 'eye' at their center. All five statements provided accurately reflect these essential physical and structural characteristics of mid-latitude cyclonic systems.

250. (B) Both Statement I and Statement II are incorrect.
Both statements are factually wrong regarding the type of radiation emitted by the sun and Earth. The sun emits energy primarily as high-energy, shortwave radiation. The Earth, being cooler, emits energy in the form of low-energy longwave or infrared radiation. The atmosphere is transparent to the sun's shortwave radiation but is very effective at absorbing the Earth's longwave radiation, which is how the planet is warmed.

251. (B) The Stratosphere, due to the presence of the Ozone layer.
The stratosphere is unique because temperature increases with altitude, a phenomenon known as a temperature inversion. This occurs because the ozone layer, situated within this atmospheric layer, absorbs ultraviolet radiation from the sun. This absorption process generates heat, leading to the observed thermal structure which contrasts sharply with the cooling trend seen in the underlying troposphere.

252. (A) Gases that are small in volume can have a disproportionately large impact on climatic processes.
Atmospheric composition includes permanent gases like nitrogen and variable gases like carbon dioxide. While variable gases exist in much smaller volumes compared to nitrogen or oxygen, they possess a significant ability to influence meteorological and climatic processes. This demonstrates that the relative abundance of a gas does not necessarily determine its overall impact on the complex Earth system.

253. (C) The Troposphere contains the majority of the atmosphere's mass and water vapour.
The troposphere contains the majority of the atmosphere's total mass and almost all of its water vapour. These two factors are critical for the formation of clouds, precipitation, and general weather systems. Because other layers lack significant moisture and density, atmospheric instability and meteorological events are effectively confined to this lowest region of the Earth's gaseous envelope.

254. (D) The distinct thermal characteristics and temperature gradients.
Scientists demarcate the atmosphere into several distinct layers based on thermal properties and temperature gradients. Each layer, such as the troposphere or stratosphere, exhibits a specific pattern of temperature change in relation to altitude. These vertical variations in heat, whether decreasing or increasing with height, provide a consistent physical basis for defining the primary structural boundaries of the atmosphere.

255. (C) The occurrence of the environmental lapse rate in the Mesosphere.
The troposphere is specifically identified by the environmental lapse rate, where temperature decreases as altitude increases. While the mesosphere also sees temperatures drop with height, the passage explicitly links the lapse rate concept to the troposphere. Therefore, describing this specific thermal characteristic as a primary feature of the mesosphere contradicts the atmospheric structure and principles detailed in the source.

256. (B) The equilibrium between absorbed incoming shortwave radiation and emitted outgoing longwave radiation.
The heat budget represents the delicate balance between the solar energy the planet absorbs and the energy it reflects or radiates back into space. Shortwave radiation arrives from the sun, while longwave radiation is emitted by the surface. This equilibrium ensures that the Earth maintains a stable long-term average temperature, preventing continuous heating or cooling over extended periods.

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patterns effectively guide the day-to-day weather experienced at the surface.

275. (C) negligible effect of friction in the upper atmosphere.
Surface winds are subject to frictional drag from the Earth's topography, which slows the wind and reduces the Coriolis effect. In the upper atmosphere, however, this frictional force becomes negligible. Consequently, the wind is primarily governed by the balance between the pressure gradient and Coriolis forces. This lack of friction is the fundamental difference between low-level and high-level atmospheric dynamics.

276. (A) The release of latent heat from condensing water vapour.
Tropical cyclones are powerful weather systems that develop over warm oceanic waters. Their primary energy source is the latent heat released during the condensation of water vapour. As moist air rises and cools, the water vapour turns into liquid droplets, releasing massive amounts of energy. This process fuels the intense winds and low central pressure characteristic of hurricanes and typhoons.

277. (D) temperate cyclones are associated with fronts, whereas tropical cyclones are not.
Temperate cyclones originate along the polar front, where air masses of different temperatures collide, making them frontal systems. Tropical cyclones, however, form within a single, warm air mass over tropical oceans and do not involve fronts. This structural difference is key, as temperate cyclones rely on temperature contrasts for energy, whereas tropical cyclones are fueled by the release of latent heat.

278. (B) Stable atmosphere, clear skies, and calm conditions.
Anticyclones are high-pressure systems characterized by air that sinks toward the surface and spirals outward. This downward motion suppresses cloud formation and leads to very stable atmospheric conditions. Consequently, regions under the influence of an anticyclone typically experience clear skies, calm winds, and settled weather. These systems can lead to extended periods of dry conditions or seasonal temperature extremes.

279. (C) Along the polar front in the mid-latitudes.
Temperate or extratropical cyclones are large weather systems that typically form in the middle latitudes. They develop along the polar front, which is the boundary zone where cold polar air masses meet warmer subtropical air masses. The interaction and temperature contrast between these differing air masses provide the energy necessary for the formation and intensification of these complex, frontal-based storm systems.

280. (D) the center of the storm is warmer than its surroundings at the same altitude.
The term warm-core system refers to the thermal structure of a tropical cyclone, where the temperature at the center of the storm is higher than the surrounding environment at the same altitude. This internal heat is maintained by the continuous release of latent heat from condensation. This characteristic distinguishes tropical cyclones from temperate cyclones, which are cold-core systems driven by temperature contrasts.

281. (A) The distribution of natural vegetation is the ultimate expression of a region's climate.
Wladimir Köppen developed his climatic classification system based on the observation that native vegetation patterns are the most accurate indicators of a region's climate. He selected specific temperature and precipitation thresholds that aligned with the boundaries of different plant communities. This empirical approach assumes that the types of plants naturally growing in an area reflect the long-term averages of its weather.

282. (B) major temperature and precipitation characteristics.
The five major climate groups in the Köppen system are distinguished using broad temperature and precipitation patterns. Groups like A, C, D, and E are primarily defined by specific thermal thresholds, such as the average temperature of the coldest or warmest months. Group B is unique because it is defined by a lack of moisture relative to potential evaporation rather than temperature.

283. (B) Köppen's system uses temperature and precipitation, while Thornthwaite's focuses on potential evapotranspiration.

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Köppen's system is an empirical classification that utilizes easily measurable data like monthly temperature and annual precipitation to define climate zones. In contrast, the Thornthwaite system is more complex and emphasizes the water balance. It specifically focuses on potential evapotranspiration, which measures the amount of moisture that would evaporate and transpire if water were always available, as the primary climatic determinant.

284. (A) A tropical climate with a distinct dry season in the winter.
In the Köppen classification, the capital letter 'A' stands for a tropical climate where temperatures remain high throughout the year. The lowercase 'w' indicates a seasonal precipitation pattern with a distinct dry period during the winter months. Therefore, an 'Aw' designation represents a tropical savanna climate, which experiences warm temperatures year-round and a significant seasonal shift in rainfall availability.

285. (C) Its simplicity and reliance on readily available temperature and precipitation data.
A primary advantage of the Köppen system is its reliance on annual and monthly averages of temperature and precipitation. This data is widely collected and easily obtainable for most locations worldwide. Furthermore, the system is simple to apply and correlates strongly with observable vegetation patterns. These factors make it a practical and accessible tool for scientists studying geography, ecology, and environmental systems.

286. (D) The eastward movement of warm surface water in the equatorial Pacific.
An El Niño event is characterized by a significant weakening of the trade winds across the equatorial Pacific. This change allows a massive volume of warm surface water, which is normally pushed toward the west, to flow eastward toward the coast of South America. This redistribution of heat disrupts normal oceanic and atmospheric patterns, leading to widespread changes in global weather.

287. (C) a recurring pattern of atmospheric pressure changes across the tropical Pacific.
The Southern Oscillation describes the atmospheric component of the ENSO phenomenon. It refers to the periodic, see-saw-like variation in surface air pressure between the eastern and western tropical Pacific Ocean. This shift in pressure is intrinsically linked to the changes in sea surface temperatures observed during El Niño and La Niña, collectively driving large-scale fluctuations in global weather and climate.

288. (B) An intensification of normal Pacific atmospheric and oceanic conditions.
La Niña represents an intensification of the normal atmospheric and oceanic conditions in the Pacific. During these events, trade winds become stronger than usual, pushing even more warm surface water toward the western Pacific. This leads to increased upwelling of cold, deep water in the east, resulting in cooler-than-average sea surface temperatures off the coast of South America and altered global rainfall.

289. (D) marine life and fishing industries off the coast of South America.
Upwelling brings cold, nutrient-rich water from the deep ocean to the surface, supporting vast populations of phytoplankton and fish. During El Niño, the eastward movement of warm water suppresses this process. The lack of nutrients significantly disrupts the marine food web, leading to a decline in fish populations. This has a direct and negative impact on the productivity of regional fishing industries.

290. (A) The interaction and coupling between the ocean and the atmosphere.
The El Niño-Southern Oscillation is a prime example of the complex coupling between the Earth's oceans and the atmosphere. Changes in sea surface temperatures directly influence atmospheric pressure and wind patterns, which in turn affect ocean currents and heat distribution. This continuous, reciprocal interaction demonstrates how these two major components of the Earth system function together to regulate global climate variability.

291. (C) A thunderstorm.
Tornadoes are violently rotating columns of air that extend from the base of a thunderstorm to the ground. They typically form under conditions of extreme atmospheric instability and strong wind shear. While not every thunderstorm produces a

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tornado, these intense local storms provide the necessary energy and structural environment required for a tornado's destructive, high-speed vortex to develop and touch down.

292. (A) An extreme amount of rainfall occurring in a short duration.
A cloudburst is a specific meteorological hazard defined by an extraordinary amount of precipitation falling within a very short period. This intense rainfall often occurs over a localized area and can exceed the drainage capacity of the land, frequently resulting in devastating flash floods. It is a extreme form of precipitation that differs from steady rainfall due to its suddenness and intensity.

293. (D) High-mountain and glacial regions.
Glacial Lake Outburst Floods are specialized hazards occurring in high-mountain environments where glaciers are present. These events happen when a natural dam, made of ice or moraine debris, suddenly fails, releasing a massive volume of stored meltwater. Triggers for such floods include heavy rainfall, rapid melting, or icefalls into the lake, making them a significant threat to communities living downstream.

294. (B) Droughts and heat waves.
Meteorological hazards can be categorized by their duration. While events like tornadoes and cloudbursts are violent and short-lived, others develop over much longer periods. Droughts and heat waves are examples of prolonged hazards. Droughts involve an extended deficiency in precipitation, while heat waves consist of several days or weeks of excessively high temperatures, both of which cause significant long-term environmental stress.

295. (C) a violently rotating column of air.
Although both phenomena are intense atmospheric disturbances, the defining feature of a tornado is its violently rotating column of air. Thunderstorms are characterized by lightning, thunder, and heavy rain, but they do not necessarily involve the concentrated, spinning vortex of high-speed winds that a tornado exhibits. This rotational energy makes tornadoes one of the most destructive and localized meteorological events in nature.

296. (D) By intensifying the natural greenhouse effect through GHG emissions.
Human activities are fundamentally altering the global climate by increasing the concentration of greenhouse gases in the atmosphere. By burning fossil fuels, clearing forests, and practicing intensive agriculture, humans release massive amounts of carbon dioxide and methane. These gases enhance the natural greenhouse effect, trapping more heat in the lower atmosphere and causing the planet's average temperature to rise over time.

297. (A) The burning of fossil fuels.
Throughout geological history, the Earth's climate has changed due to natural drivers such as volcanic eruptions, variations in solar output, and shifts in the planet's orbit. These processes occur independently of human influence. In contrast, the burning of fossil fuels is an anthropogenic activity that has only become a significant driver of climate change since the start of the industrial era.

298. (B) The net warming of the lower atmosphere and surface due to trapped longwave radiation.
Global warming refers to the net increase in the temperature of the Earth's lower atmosphere and surface. This occurs because rising concentrations of greenhouse gases effectively trap longwave radiation that would otherwise escape into space. This phenomenon is a direct consequence of an enhanced greenhouse effect and serves as a primary indicator of the broader, more complex changes currently affecting the climate.

299. (B) trapping heat that is radiated away from the Earth's surface.
Greenhouse gases such as carbon dioxide and methane allow incoming shortwave solar radiation to pass through the atmosphere and heat the surface. However, they are highly efficient at absorbing the longwave, infrared radiation that the Earth emits back toward space. By trapping this heat and re-radiating it in all directions, these gases keep the lower atmosphere significantly warmer than it otherwise would be.

300. (A) a wide-ranging set of systemic changes including altered precipitation and sea-level rise.
Human-induced climate change involves more than just a rise in average global temperatures.

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(C) A is true but R is false.
(D) A is false but R is true.

9. The layer in the ocean where temperature changes rapidly with depth is known as the:
(A) Pycnocline
(B) Halocline
(C) Thermocline
(D) Isocline

10. A tropical cyclone is an intense circular storm that originates over:
(A) Warm tropical oceans.
(B) Cold polar oceans.
(C) Large land masses.
(D) Mid-latitude deserts.

11. What is the most appropriate term for a flat-topped seamount?
(A) Atoll
(B) Trench
(C) Ridge
(D) Guyot

12. Consider the following statements about the relief of the ocean basins:
1. The continental shelf is the shallowest part of the ocean.
2. The continental slope marks the true edge of a continent.
3. Abyssal plains are characterized by rugged, mountainous terrain.
4. Mid-oceanic ridges are sites of seafloor spreading.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 4 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) 1, 2, 3 and 4

13. The continuous, predictable, and directional movement of seawater driven by forces like wind, temperature, and salinity is called an ocean:
(A) Tide
(B) Wave
(C) Current
(D) Surge

14. The horizontal and vertical circulation of ocean water helps in the redistribution of:
(A) Atmospheric pressure
(B) Coriolis force
(C) Magnetic fields
(D) Heat

15. Consider the following ocean relief features. Arrange them in the correct sequence from the coast towards the open ocean:
1. Continental Slope
2. Abyssal Plain
3. Continental Shelf
4. Continental Rise

Which of the following represents the correct sequence?
(A) 3, 1, 4, 2
(B) 1, 3, 4, 2
(C) 3, 4, 1, 2
(D) 2, 4, 1, 3

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16. Which of the following factors does NOT significantly contribute to the formation of tropical cyclones?
(A) Warm sea surface temperatures (above 26.5°C).
(B) Presence of strong vertical wind shear.
(C) Sufficient Coriolis force.
(D) Pre-existing weather disturbance.

17. Which of the following statements is correct regarding ocean waves?
(A) Waves are primarily caused by the gravitational pull of the moon and the sun.
(B) Wave energy moves forward while particles move in circular orbits.
(C) Wave speed remains constant regardless of the actual water depth.
(D) The highest point of a wave is called the trough.

18. Match List I with List II and select the correct answer using the options given below.
List I: (Ocean Current)
P. Gulf Stream
Q. Agulhas Current
R. Kuroshio Current
S. Peru Current
List II: (Ocean)
1. Indian Ocean
2. Pacific Ocean
3. Atlantic Ocean
(A) P-3, Q-1, R-2, S-2

CHAPTER 03

Oceanography

1. Which of the following best defines the 'continental shelf'?
(A) A very steep slope extending from the coastline to the ocean deep.
(B) The gently sloping submerged extension of a continent.
(C) The deepest part of the ocean, typically a long, narrow depression.
(D) A submerged volcanic mountain rising from the ocean floor.

2. The average salinity of the ocean is generally considered to be approximately:
(A) 35 parts per thousand (ppt).
(B) 25 parts per thousand (ppt).
(C) 45 parts per thousand (ppt).
(D) 55 parts per thousand (ppt).

3. Which of the following is an example of a warm ocean current?
(A) Labrador Current
(B) Benguela Current
(C) Kuroshio Current
(D) Canary Current

4. Match List I with List II and select the correct answer using the options given below.
List I: (Oceanic Feature)
P. Continental Slope
Q. Abyssal Plain
R. Mid-Oceanic Ridge
S. Oceanic Trench
List II: (Description)
1. Deep, long, and narrow depressions on the ocean floor
2. An extensive, flat region of the deep ocean floor
3. A continuous underwater mountain range
4. A steep descent from the edge of the continental shelf
(A) P-4, Q-2, R-3, S-1
(B) P-2, Q-4, R-1, S-3
(C) P-4, Q-3, R-2, S-1
(D) P-1, Q-2, R-3, S-4

5. What is the primary cause of ocean tides?
(A) The force of wind blowing over the ocean surface.
(B) The variation in atmospheric pressure over the oceans.
(C) The gravitational pull of the Moon and the Sun on the Earth.
(D) The heat from the sun causing water to expand and contract across basins.

6. The term 'tsunami' is used to describe a large ocean wave primarily caused by:
(A) Storm surges during a tropical cyclone.
(B) Submarine earthquakes or volcanic eruptions.
(C) The gravitational pull of the moon.
(D) Strong, persistent surface winds over a large fetch.

7. Which of the following statements about ocean temperature is INCORRECT?
(A) The primary source of heat for the oceans is solar insolation.
(B) Ocean currents play a significant role in the redistribution of heat.
(C) The highest ocean surface temperatures are generally found in the tropics.
(D) The temperature of ocean water is uniform from the surface to the bottom.

8. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The density of seawater increases with an increase in salinity.
Reason (R) : Salinity adds dissolved salts to the water, increasing its mass per unit volume.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

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266. (B) maritime tropical (mT).
Air masses are classified based on their source region's latitude and the nature of the underlying surface. Tropical air masses originate in low latitudes and are denoted by a lowercase 't'. Those forming over oceans are labeled maritime, represented by a lowercase 'm'. Thus, a warm, humid air mass from a low-latitude ocean is designated as maritime tropical.

267. (B) The difference in density between two colliding air masses.
A front is a transition zone that forms when two air masses with contrasting temperatures and moisture levels meet. Because these air masses have different densities, they do not mix easily or uniformly. The denser, colder air tends to stay low, while the less dense, warmer air is forced upward. This physical resistance to mixing creates the distinct frontal boundary.

268. (A) Rapid temperature drop and intense, short-duration precipitation.
Cold fronts involve a dense, cold air mass advancing and aggressively displacing a warmer air mass. This rapid lifting of warm air typically leads to the formation of steep clouds and intense precipitation. As the front passes, temperatures drop significantly and quickly. These systems are generally associated with short-lived but vigorous weather events compared to the more gradual warm fronts.

269. (C) An extensive surface with relatively uniform conditions where air can stagnate.
A source region is a large portion of the Earth's surface where air can remain stationary for an extended period. To properly impart specific characteristics to an air mass, the region must have relatively uniform temperature and moisture conditions throughout. This geographical stability allows the overlying air to gradually adopt the thermal and humidity properties of the land or water below.

270. (D) A warm front involves a warmer air mass overriding a colder one, while a cold front involves a colder air mass displacing a warmer one.
The distinction between these two fronts lies in which air mass is more active and how they interact. A warm front occurs when a lighter, warm air mass gradually overrides a colder one. In a cold front, the denser, cold air mass actively pushes underneath and displaces the warmer air. These different movements result in distinct cloud types and precipitation patterns.

271. (C) The balance achieved between the pressure gradient force and the Coriolis force.
In the upper atmosphere, the lack of surface friction allows the pressure gradient force and the Coriolis force to interact without interference. When these two opposing forces reach a balance, the resulting geostrophic wind flows parallel to the lines of constant pressure, or isobars. This unique flow pattern is a defining characteristic of high-altitude circulation, contrasting with the angled surface winds.

272. (B) Narrow, high-velocity wind bands in the upper troposphere.
Jet streams are concentrated bands of high-speed winds located in the upper troposphere. These predominantly westerly currents move at very high velocities and follow meandering paths across the globe. They are narrow in comparison to the wider atmospheric circulation patterns and play a crucial role in regulating global weather by influencing the development and movement of various pressure systems below.

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273. (D) Along the boundaries between contrasting air masses.
High-velocity jet streams typically form near the boundaries where major air masses of significantly different temperatures meet. These regions exhibit strong horizontal temperature gradients, which in turn create the pressure differences necessary to drive intense wind speeds. These atmospheric currents are most prominent where cold polar air interacts with warmer subtropical air, creating the polar and subtropical jet streams.

274. (A) It acts as a guiding force, influencing the path and intensity of cyclones and anticyclones.
Upper air circulation, particularly the movement of jet streams, has a profound impact on surface conditions. These high-altitude winds function as a steering mechanism that determines the path and speed of surface cyclones and anticyclones. By influencing where these systems move and how they develop or dissipate, upper air

(B) P-3, Q-2, R-1, S-1
(C) P-1, Q-2, R-3, S-3
(D) P-2, Q-1, R-2, S-3

19. A 'spring tide', characterized by a very high tidal range, occurs when:
(A) The Sun and Moon are at a right angle to each other with respect to the Earth.
(B) The Moon is at its perigee position.
(C) The Sun, Earth, and Moon are aligned in a straight line.
(D) A tropical cyclone makes landfall.

20. The change in sea level due to the melting of continental ice sheets is an example of a:
(A) Isostatic change
(B) Tectonic change
(C) Diurnal change
(D) Eustatic change

21. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The west coasts of continents in the mid-latitudes are bordered by cold ocean currents.
Reason (R) : In the mid-latitudes, the prevailing winds blow from west to east, pushing surface water away from the western continental margins.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

22. A tsunami travels at very high speeds in the open ocean but slows down dramatically as it approaches a coastline. This change in speed is an application of the principle that wave speed is dependent on:
(A) Water temperature
(B) Water depth
(C) Water salinity
(D) Wind speed

23. The 'eye' of a mature tropical cyclone is a region characterized by:
(A) The strongest winds and heaviest rain.
(B) Descending cold air.
(C) Maximum storm surge.
(D) Calm weather and light winds.

24. Consider the following factors influencing ocean water composition and circulation:
1. Evaporation
2. Precipitation
3. River runoff
4. Wind
5. Gravitational pull of the Moon

Which of these factors directly influence the salinity of ocean water?
(A) 1, 2 and 3 only
(B) 1, 4 and 5 only
(C) 2, 3 and 4 only
(D) All of the above

25. The gradual submergence of the continental margin to form a gently sloping plain is known as the:
(A) Continental slope
(B) Abyssal plain
(C) Continental shelf
(D) Continental rise

26. Which of the following pairs of Current and its characteristic is correctly matched?
(A) Labrador Current - Cold Current
(B) Gulf Stream - Cold Current
(C) Benguela Current - Warm Current
(D) Agulhas Current - Cold Current

27. The term 'halocline' refers to a zone in the ocean where there is a sharp change in:
(A) Temperature with depth
(B) Density with depth
(C) Pressure with depth
(D) Salinity with depth

28. Which of the following is the most abundant salt in seawater?
(A) Magnesium Chloride
(B) Sodium Chloride
(C) Calcium Sulfate
(D) Potassium Bromide

29. Which of the following statements about tides is correct?
(A) Diurnal tides are characterized by two high tides and two low tides each day.

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a wave (or waves) that travels up a river or narrow bay.

112. The most critical factor for the intensification of a tropical cyclone is:
(A) A continuous supply of heat and moisture from a warm ocean surface.
(B) A strong vertical wind shear to ventilate the storm.
(C) The presence of a large landmass nearby.
(D) A very deep thermocline.

113. Consider the following major ocean relief zones. Arrange them in order of increasing average depth:
1. Abyssal Plain
2. Continental Shelf
3. Oceanic Trench
4. Continental Slope

Which of the following represents the correct sequence?
(A) 2, 4, 1, 3
(B) 2, 1, 4, 3
(C) 1, 2, 4, 3
(D) 4, 2, 1, 3

114. The temperature of ocean water normally decreases with increasing depth because:
(A) Colder water is less dense and stays at the surface.
(B) Geothermal heat from the Earth's core is blocked by sediments.
(C) Pressure increases with depth, which cools the water.
(D) The primary source of heat, the sun, only warms the surface layers.

115. What is the primary difference between a wave of oscillation and a wave of translation?
(A) Oscillation involves circular orbits; translation involves forward movement.
(B) A wave of oscillation moves water horizontally, while a wave of translation moves it vertically across the basin.
(C) A wave of oscillation is found in deep water, while a wave of translation is another name for a tide.
(D) A wave of translation is caused by wind, and a wave of oscillation is caused by earthquakes.

116. The Grand Banks of Newfoundland are a world-famous fishing ground due to the:
(A) Presence of a large, warm subtropical gyre.
(B) Mixing of the cold Labrador Current and the warm Gulf Stream.
(C) Upwelling of nutrient-rich deep water.
(D) Abundance of volcanic nutrients from the Mid-Atlantic Ridge.

117. Which of these is NOT a direct hazard associated with tropical cyclones?
(A) Strong winds
(B) Earthquakes
(C) Heavy rainfall and flooding
(D) Storm surge

118. The global conveyor belt is another name for:
(A) The thermohaline circulation
(B) The surface gyre system
(C) The trade wind system
(D) The pattern of semi-diurnal tides

119. A 'guyot' is different from a 'seamount' in that a guyot:
(A) Is much taller.
(B) Is formed by sediments, not lava.
(C) Has a flat, eroded top.
(D) Is only found in trenches.

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120. Which of these water bodies would you expect to have the highest surface salinity?
(A) The Amazon River estuary
(B) The Bay of Bengal
(C) The Baltic Sea
(D) The Red Sea

121. Consider the following statements regarding tides:
1. Spring tides have a greater tidal range than neap tides.
2. Tides are a type of shallow-water wave.
3. The Moon's gravitational pull on tides is stronger than the Sun's.
4. A location experiences spring tides only during the spring season.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) All of the above

40. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : Tsunamis have a very long wavelength in the open ocean.

Reason (R) : The speed of a tsunami is directly proportional to the depth of the water through which it travels.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

41. In the context of ocean waves, the horizontal distance between two successive crests is called:
(A) Wave height
(B) Wave amplitude
(C) Wavelength
(D) Wave period

42. The process of upwelling, where deep, cold, nutrient-rich water rises to the surface, is often associated with:
(A) The divergence of surface currents, particularly along coastlines.
(B) The convergence of surface currents.
(C) The center of large ocean gyres.
(D) The formation of tropical cyclones.

43. Consider the following statements about tropical cyclones:
1. They are also known as hurricanes in the Atlantic and typhoons in the Western Pacific.
2. They derive their energy from the latent heat of condensation.
3. They weaken rapidly upon making landfall.
4. The central calm region of the storm is called the eyewall.
5. They require the Coriolis force to initiate their rotation.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3 and 4
(B) 1, 2, 3 and 5
(C) 2, 3, 4 and 5
(D) 1, 3, 4 and 5

44. Which of the following is the best description of the Continental Slope?
(A) A gently sloping area with thick sediment deposits.
(B) A very steep feature that marks the boundary between continental and oceanic crust.
(C) A flat, featureless plain in the deep ocean.
(D) A submerged mountain chain formed by volcanic activity.

45. The density of pure water is highest at approximately:
(A) 0°C
(B) 10°C
(C) 4°C
(D) 100°C

46. Which of the following best explains why the salinity of the Baltic Sea is very low?
(A) High rates of surface evaporation and limited water circulation.
(B) It is located in a polar region where water is constantly freezing.
(C) Intense volcanic activity on the seafloor adds fresh water.
(D) Large riverine freshwater influx and limited open ocean connection.

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47. The large, circular loops of ocean currents in major ocean basins are called:
(A) Gyres
(B) Eddies
(C) Whirlpools
(D) Upwellings

48. A eustatic change in sea level refers to a global change caused by:
(A) The sinking or rising of a local landmass.
(B) An increase or decrease in the volume of water in the oceans.
(C) The deposition of sediment at a river delta.
(D) Tectonic plate movement along a specific coast.

49. Which of the following is an INCORRECT statement regarding the effects of ocean currents?
(A) Warm currents make coastal areas warmer than their latitude would suggest.
(B) The mixing of warm and cold currents creates poor fishing grounds.

seasonal variations in solar insolation.
(D) The salinity is higher in the mid-latitudes.

70. The circulation pattern in the North Atlantic, involving the Gulf Stream, North Atlantic Drift, Canary Current, and North Equatorial Current, is an example of a:
(A) Thermohaline circulation
(B) Subtropical gyre
(C) Polar front
(D) Coastal upwelling system

71. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The Red Sea exhibits high salinity.
Reason (R) : The Red Sea is a largely enclosed sea in a hot, arid region with high evaporation rates and limited freshwater inflow.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

72. Lines on a map connecting points of equal salinity in the ocean are called:
(A) Isotherms
(B) Isobars
(C) Isobaths
(D) Isohalines

73. The movement of water particles in a deep-water wave is best described as:
(A) Linear
(B) Elliptical
(C) Circular
(D) Stationary

74. Consider the following ocean currents:
1. Labrador Current
2. Gulf Stream
3. Benguela Current
4. Agulhas Current
5. California Current
Which of the above currents are classified as cold currents?
(A) 1, 2, and 4
(B) 2, 4, and 5
(C) 1, 3, and 5
(D) 2, 3, and 4

75. The daily or twice-daily rise and fall of sea level is defined as:
(A) A wave
(B) A current
(C) A storm surge
(D) A tide

76. Which part of a tropical cyclone contains the storm's strongest winds and heaviest precipitation?
(A) The eye
(B) The eyewall
(C) The outer rainbands
(D) The leading edge

77. The term 'thermohaline circulation' refers to the large-scale ocean circulation driven by:
(A) Global wind patterns.
(B) Global density gradients created by surface heat and freshwater fluxes.
(C) Gravitational forces of the Moon and Sun.
(D) Tectonic activity along mid-ocean ridges.

78. The economic significance of the continental shelf is primarily due to its richness in:
(A) Fisheries and petroleum reserves
(B) Polymetallic nodules
(C) Hydrothermal vents
(D) Deep-sea corals

79. A tide pattern featuring one high tide and one low tide each lunar day is called a:
(A) Semi-diurnal tide
(B) Neap tide
(C) Diurnal tide
(D) Mixed tide

80. A tsunami warning system primarily relies on the detection of:
(A) Strong winds
(B) Changes in sea surface temperature
(C) A rapid drop in atmospheric pressure
(D) Seismic activity on the ocean floor

81. The average depth of the abyssal plains is approximately:
(A) 200 meters

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(B) P-3, Q-2, R-1, S-4
(C) P-4, Q-3, R-2, S-1
(D) P-1, Q-2, R-3, S-4

59. The 'Coriolis effect' influences ocean currents by:
(A) Causing them to form in the first place.
(B) Increasing their speed as they approach the equator.
(C) Making them colder on the western side of major ocean basins.
(D) Deflecting paths right in the North and left in the South.

60. Which of the following is NOT a necessary condition for the formation of a tropical cyclone?
(A) Sea surface temperature of 20°C or less.
(B) A location at least 5 degrees of latitude away from the equator.
(C) A pre-existing low-level atmospheric disturbance.
(D) Low vertical wind shear between the surface and the upper troposphere.

61. What is the most appropriate definition of ocean salinity?
(A) Specific concentration of sodium chloride and magnesium salts.
(B) The measure of water's clarity and color.
(C) Total solid material in grams contained in one kilogram of seawater.
(D) The total weight of water in a given volume.

62. Submarine canyons are steep-sided valleys cut into the:
(A) Abyssal plain
(B) Continental shelf and slope
(C) Mid-oceanic ridge
(D) Oceanic trenches

63. When the gravitational forces of the Sun and Moon act at right angles to each other with respect to the Earth, the resulting tides are called:
(A) Spring Tides
(B) Diurnal Tides
(C) Neap Tides
(D) Ebb Tides

64. Which of the following pairs is incorrectly matched?
(A) Cyclone - Indian Ocean
(B) Hurricane - Atlantic Ocean
(C) Typhoon - Western Pacific Ocean
(D) Willy-willy - Mediterranean Sea

65. The thermal expansion of seawater due to global warming is a significant contributor to:
(A) Eustatic sea level rise
(B) Isostatic sea level rise
(C) Increased ocean salinity
(D) The strengthening of the Coriolis effect

66. Consider the following statements about ocean density:
1. Colder water is generally denser than warmer water.
2. Fresher water is denser than saltier water.
3. Density is a key driver of deep ocean (thermohaline) circulation.
4. In the ocean, water density is uniform from surface to bottom.

Which of the above statement(s) is/are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2 and 3
(D) All of the above

67. The phenomenon where a tsunami wave recedes from the coastline before arriving as a massive wave is known as:
(A) Surge
(B) Swash
(C) Drawback
(D) Backwash

68. The region of the ocean floor that lies between the continental slope and the abyssal plain is the:
(A) Continental shelf
(B) Mid-oceanic ridge
(C) Oceanic trench
(D) Continental rise

69. The annual range of sea surface temperature is much greater in the mid-latitudes than in the tropics. This is primarily because:
(A) The tropics receive direct sunlight all year round with little variation.
(B) Ocean currents are weaker in the mid-latitudes.
(C) The mid-latitudes experience significant

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(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

91. The term 'fetch' in the context of wave generation refers to:
(A) The depth of the water.
(B) The time the wind blows over the water.
(C) The speed of the wind.
(D) The uninterrupted distance over which the wind blows.

92. Which of the following ocean basins is characterized by a major mid-oceanic ridge that runs nearly down its center, resembling the seam on a baseball?
(A) Atlantic Ocean
(B) Pacific Ocean
(C) Arctic Ocean
(D) Indian Ocean

93. Consider the following statements about ocean salinity:
1. Salinity is higher in the tropics than at the equator.
2. The highest salinity is found in enclosed or semi-enclosed seas in arid regions.
3. The North Sea records higher salinity than the Baltic Sea.
4. Salinity generally decreases with depth in the low latitudes.

Which of the above statement(s) is/are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

94. The ebb tide is the period between:
(A) Low tide and the following high tide.
(B) Two successive high tides.
(C) Two successive low tides.
(D) High tide and the following low tide.

95. The energy that powers tropical cyclones is primarily:
(A) Latent heat released during condensation.
(B) Kinetic energy from wind.
(C) Potential energy from the storm's height.
(D) Geothermal heat from the ocean floor.

96. The gradual slope composed of sediments deposited at the base of the continental slope is called the:
(A) Continental shelf
(B) Continental rise
(C) Abyssal fan
(D) Submarine canyon

97. If a water sample has a salinity of 32 ppt, it means that there are:
(A) 32 grams of salt in 100 grams of seawater.
(B) 32 grams of salt in 1,000 grams of seawater.
(C) 32 kilograms of salt in 1,000 kilograms of seawater.
(D) 32 grams of salt in 10,000 grams of seawater.

98. The Kuroshio Current is to the Pacific Ocean what the _____ is to the Atlantic Ocean.
(A) Gulf Stream
(B) Canary Current
(C) Labrador Current
(D) Benguela Current

99. A tide pattern with two high tides and two low tides of unequal height each day is known as a:
(A) Diurnal tide
(B) Semi-diurnal tide
(C) Mixed semi-diurnal tide
(D) Spring tide

100. In the context of a tsunami, which of the following is most dangerous for a ship?
(A) Being in the deep open ocean when the tsunami passes.
(B) Being directly over the epicenter of the earthquake.
(C) Being in the path of the initial drawback.
(D) Being in a port or shallow water when the tsunami arrives.

101. Consider the following statements regarding oceanic relief and circulation:
1. Mid-oceanic ridges are zones of crustal divergence.
2. Subduction zones are associated with oceanic trenches.
3. The Coriolis effect is strongest at the poles.
4. Upwelling brings nutrient-poor water to the surface.

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(B) 1000 meters
(C) 4000 meters
(D) 10000 meters

82. Which of the following factors would lead to an increase in the density of seawater?
(A) An increase in temperature and a decrease in salinity.
(B) A decrease in temperature and an increase in salinity.
(C) An increase in temperature and an increase in salinity.
(D) A decrease in temperature and a decrease in salinity.

83. Consider the following events in the life cycle of a tsunami. Arrange them in chronological order:
1. Slowdown and height increase near the coast.
2. Generation by a submarine earthquake.
3. Propagation across the open ocean at high speed.
4. Inundation of coastal areas.

Which of the following represents the correct sequence?
(A) 2, 3, 1, 4
(B) 3, 2, 1, 4
(C) 2, 1, 3, 4
(D) 1, 2, 3, 4

84. The Sargasso Sea, known for its floating sargassum seaweed, is located within a gyre in the:
(A) North Atlantic Ocean
(B) North Pacific Ocean
(C) South Atlantic Ocean
(D) Indian Ocean

85. Which of the following statements about the relief of the ocean is INCORRECT?
(A) Mid-oceanic ridges are the longest mountain chains on Earth.
(B) Oceanic trenches are the deepest parts of the ocean.
(C) The continental shelf has a very steep gradient, typically more than 10 degrees.
(D) Guyots are flat-topped seamounts, thought to be eroded ancient volcanoes.

86. Match List I with List II and select the correct answer using the options given below.

List I: (Tide Type)
P. Spring Tide
Q. Neap Tide
R. Diurnal Tide
S. Semi-diurnal Tide

List II: (Characteristic)
1. One high and one low tide per day
2. Two unequal high and two unequal low tides per day
3. Maximum tidal range
4. Minimum tidal range

(A) P-3, Q-4, R-1, S-2
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-4, R-2, S-1
(D) P-1, Q-2, R-3, S-4

87. The primary reason for the deflection of ocean currents (Coriolis effect) is:
(A) The shape of the ocean basins.
(B) The gravitational pull of the moon.
(C) Differences in water density.
(D) The Earth's rotation.

88. The most significant cause of recent global sea-level rise is a combination of:
(A) Tectonic uplift and volcanic activity.
(B) Thermal expansion of water and melting of terrestrial ice.
(C) Increased sediment load from rivers and regional isostatic rebound.
(D) Changes in Earth's orbital parameters and solar output.

89. A 'cold-core' eddy in the Northern Hemisphere is a rotating body of cold water that spins:
(A) Clockwise and has a depressed sea surface.
(B) Clockwise and has an elevated sea surface.
(C) Counter-clockwise and has a depressed sea surface.
(D) Counter-clockwise and has an elevated sea surface.

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90. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : Cyclones do not form at the equator.

Reason (R) : The Coriolis force, which is essential for imparting rotation to storms, is zero at the equator.

(B) Spring tides occur during the first and third quarter moon phases.
(C) The tidal range is the vertical distance between a high tide and the subsequent low tide.
(D) Tides are caused solely by the gravitational pull of the Sun.

30. The "storm surge" associated with a cyclone is a rise in sea level caused primarily by:
(A) Strong onshore winds and low atmospheric pressure.
(B) The heavy rainfall from the cyclone.
(C) Underwater earthquakes triggered by shifting storm pressure.
(D) The gravitational pull of the storm clouds.

31. What is the primary driving force for most surface ocean currents?
(A) Density differences
(B) Salinity gradients
(C) Earth's rotation
(D) Wind

32. The deepest parts of the oceans are the trenches. Which ocean contains the largest number of these features?
(A) Atlantic Ocean
(B) Pacific Ocean
(C) Indian Ocean
(D) Arctic Ocean

33. Consider the following statements regarding the factors affecting ocean salinity:
1. High rates of evaporation increase salinity.
2. Influx of freshwater from rivers decreases salinity.
3. Melting of ice increases salinity.
4. Freezing of sea ice increases the salinity of the remaining water.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 2 and 4
(D) 1, 3 and 4

34. The vertical distance between a wave's crest and trough is known as the:
(A) Wavelength
(B) Wave height
(C) Wave period
(D) Wave frequency

35. Isostatic sea-level changes are localized changes caused by:
(A) Changes in the total volume of water in the ocean basins.
(B) The thermal expansion of seawater.
(C) The rise and fall of the land itself.
(D) The melting of polar ice caps.

36. Match List I with List II and select the correct answer using the options given below.
List I: (Oceanographic Term)
P. Thermocline
Q. Pycnocline
R. Halocline
S. Isobar
List II: (Definition)
1. Zone of rapid salinity change
2. Line of equal atmospheric pressure
3. Zone of rapid temperature change
4. Zone of rapid density change
(A) P-3, Q-4, R-1, S-2
(B) P-3, Q-1, R-4, S-2
(C) P-4, Q-3, R-1, S-2
(D) P-1, Q-2, R-3, S-4

37. A 'neap tide', characterized by a low tidal range, occurs when:
(A) The Sun, Earth, and Moon are aligned in a straight line.
(B) The Earth is closest to the Sun.
(C) The Sun and Moon are at a right angle to each other with respect to the Earth.
(D) The Moon is at its apogee position.

38. The circulation of deep ocean water is primarily driven by differences in:
(A) Wind speed
(B) Temperature and salinity (density)
(C) Atmospheric pressure
(D) Seafloor topography

39. Which of the following is NOT considered a major ocean relief feature?
(A) Continental Shelf
(B) Mid-Oceanic Ridge
(C) Abyssal Plain
(D) Coral Reef

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5. Warm currents are generally found on the eastern side of ocean basins in the tropics.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 3, and 5 only
(C) 1, 2, 4, and 5
(D) 1, 3, and 4 only

102. The transfer of heat in the ocean through the movement of water is a process of:
(A) Conduction
(B) Convection
(C) Radiation
(D) Insolation

103. The term 'isobath' refers to a line connecting points of equal:
(A) Temperature
(B) Salinity
(C) Pressure
(D) Depth

104. Which of the following is an effect of cold ocean currents?
(A) They are associated with the formation of coastal deserts and fog.
(B) They bring warm and humid conditions to coastal areas.
(C) They are typically poor in nutrients and support little marine life.
(D) They increase the temperature of air masses passing over them.

105. The destructive power of a tsunami comes from its long wavelength and:
(A) Its high temperature.
(B) The strong winds associated with it.
(C) The large volume of water it moves.
(D) Its high salinity.

106. Match List I with List II and select the correct answer using the options given below.
List I: (Regional Name of Cyclone)
P. Hurricane
Q. Typhoon
R. Cyclone
S. Willy-Willy
List II: (Region)
1. North-west Australia
2. Caribbean Sea / Atlantic
3. Indian Ocean
4. China Sea / West Pacific
(A) P-2, Q-4, R-3, S-1
(B) P-2, Q-3, R-4, S-1
(C) P-3, Q-4, R-2, S-1
(D) P-1, Q-2, R-3, S-4

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107. The slow, deep-water circulation of the world's oceans is known as:
(A) The Gyre circulation
(B) The Ekman spiral
(C) The Geostrophic flow
(D) The Thermohaline circulation

108. Which of the following relief features is formed by volcanic activity on the ocean floor?
(A) Submarine Canyon
(B) Seamount
(C) Continental Rise
(D) Abyssal Fan

109. Which of the following processes decreases the salinity of ocean water?
(A) Evaporation
(B) Formation of sea ice
(C) River runoff
(D) Upwelling of deep water

110. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The eastern coasts of continents in tropical and subtropical latitudes receive more rainfall than the western coasts.
Reason (R) : Warm ocean currents flow along the eastern coasts, bringing moisture, while cold currents flow along the western coasts, causing dry and stable conditions.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

111. A 'tidal bore' is a phenomenon where:
(A) The tide comes in as a single, large wave.
(B) Two tides meet and cancel each other out.
(C) The water level remains stationary for a long period.
(D) The leading edge of the incoming tide forms

(C) Cold currents can lead to the formation of coastal deserts.
(D) Ocean currents are important for navigation.

50. The Saffir-Simpson Hurricane Wind Scale is used to classify cyclones based on their:
(A) Sustained wind speed
(B) Rainfall intensity
(C) Storm surge height
(D) Diameter

51. Arrange the following salts found in seawater in descending order of their abundance:
1. Magnesium Chloride
2. Sodium Chloride
3. Magnesium Sulfate
4. Calcium Sulfate

Which of the following represents the correct order?
(A) 2, 1, 3, 4
(B) 1, 2, 3, 4
(C) 2, 3, 1, 4
(D) 4, 3, 2, 1

52. The term 'pycnocline' defines a layer within a body of water where there is a rapid change in:
(A) Salinity
(B) Temperature
(C) Oxygen content
(D) Density

53. The abyssal plains of the ocean are best described as:
(A) Steeply sloping regions with many submarine canyons.
(B) Underwater mountain ranges with active volcanoes.
(C) Extremely flat and featureless deep-ocean floors.
(D) Shallow, submerged extensions of continents.

54. Consider the following statements about ocean currents:
1. Warm currents flow from lower latitudes to higher latitudes.
2. Cold currents flow from higher latitudes to lower latitudes.
3. The Gulf Stream is a prominent cold current in the Atlantic Ocean.
4. The Peru Current is a warm current that causes arid conditions in Chile.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) 1, 2 and 4

55. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : A tsunami wave is barely noticeable in the deep, open ocean.
Reason (R) : In deep water, the energy of the tsunami is spread throughout the entire water column, resulting in a very low wave height.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

56. The time it takes for two successive wave crests to pass a stationary point is called the:
(A) Wavelength
(B) Wave period
(C) Wave height
(D) Wave frequency

57. The rise of a landmass after the melting of a heavy ice sheet that was depressing it is an example of:
(A) Eustatic adjustment
(B) Tectonic subsidence
(C) Isostatic rebound
(D) Thermal expansion

58. Match List I with List II and select the correct answer using the options given below.
List I: (Hazard)
P. Tsunami
Q. Tropical Cyclone
R. Spring Tide
S. Storm Surge
List II: (Primary Cause)
1. Alignment of Sun, Moon, and Earth
2. Low pressure and strong winds of a cyclone
3. Submarine earthquake
4. Latent heat over warm ocean waters
(A) P-3, Q-4, R-1, S-2

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122. Eustatic sea-level change is a uniform, global phenomenon, whereas isostatic change is:
(A) Also uniform and global.
(B) Local or regional in scale.
(C) Always related to temperature.
(D) Only caused by human activity.

123. The vertical zonation of the ocean based on light penetration is divided into the photic, dysphotic, and _____ zones.
(A) Benthic
(B) Pelagic
(C) Neritic
(D) Aphotic

124. The California Current and the Peru (Humboldt) Current are analogous cold currents found in the:
(A) Pacific Ocean
(B) Atlantic Ocean
(C) Indian Ocean
(D) Arctic Ocean

125. The 'drawback' or 'recession' of the sea from the coast is a well-known precursor to the arrival of a:
(A) Tropical cyclone
(B) Spring tide
(C) Tsunami
(D) Rogue wave

126. The structure of a mature tropical cyclone consists of all of the following EXCEPT:
(A) A cold front at its leading edge.
(B) A central eye with calm conditions.
(C) An eyewall with the most intense weather.
(D) Spiral rainbands.

127. The main cause for the existence of the Mid-Oceanic Ridge system is:
(A) The convergence of tectonic plates.
(B) The accumulation of marine sediments.
(C) The subsidence of continental crust.
(D) The divergence (spreading apart) of tectonic plates.

128. In which of the following scenarios would you expect the highest local salinity?
(A) The mouth of a large river during a flood.
(B) An enclosed lagoon in a hot, dry climate.
(C) A region where a large iceberg has just melted.
(D) An area with heavy, persistent rainfall.

129. The circulation in the major ocean gyres is clockwise in the Northern Hemisphere and counter-clockwise in the Southern Hemisphere due to the:
(A) Shape of the continents
(B) Thermohaline circulation
(C) Coriolis effect and wind patterns
(D) Gravitational pull of the moon

130. The speed of a shallow-water wave, such as a tide or a tsunami, is controlled primarily by:
(A) Wind speed
(B) Water temperature
(C) Wave height
(D) Water depth

131. Match List I with List II and select the correct answer using the options given below.
List I: (Concept)
P. Thermohaline Circulation
Q. Surface Wind-driven Circulation
R. Sea Floor Spreading
S. Subduction
List II: (Associated Feature)
1. Mid-Oceanic Ridge
2. Oceanic Trench
3. Deep water formation in polar regions
4. Subtropical Gyre
(A) P-3, Q-4, R-1, S-2
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-1, Q-2, R-3, S-4

132. The inundation and flooding of coastal areas during a cyclone is primarily caused by:
(A) The cyclone's wind speed alone.
(B) The storm surge.
(C) The overflowing of rivers due to heavy rain.
(D) The high tide coinciding with the cyclone.

133. The most significant long-term, non-anthropogenic cause of eustatic sea-level change is:
(A) The annual variation in Earth's orbit.
(B) The deposition of sediments by rivers.
(C) The cycle of glacial and interglacial periods.
(D) The movement of tectonic plates.

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(B) Rise, Shelf, Slope, Plain
(C) Shelf, Slope, Rise, Plain
(D) Plain, Rise, Slope, Shelf

224. Which of the following is NOT a cause of a tsunami?
(A) Submarine earthquake
(B) Volcanic eruption on an island
(C) Large coastal landslide into the sea
(D) Powerful hurricane

225. A 'storm surge' is the abnormal rise in sea level generated by a storm, over and above the predicted:
(A) Astronomical tide
(B) Wave height
(C) River level
(D) Air pressure

226. The Coriolis effect is zero at the equator and increases towards the:
(A) Tropics
(B) Poles
(C) Mid-latitudes
(D) West

227. The most important factor influencing the temperature distribution of the oceans is:
(A) Salinity
(B) Seafloor spreading
(C) Latitude
(D) Tides

228. Which of the following currents is responsible for the relatively mild winters in Northern and Western Europe?
(A) Labrador Current
(B) Canary Current
(C) Greenland Current
(D) North Atlantic Drift

229. If you were on a ship in the middle of the Pacific Ocean and a tsunami passed underneath you, what would you most likely experience?
(A) The ship would be violently thrown and likely capsize.
(B) The ship would be lifted up on a single giant wave.
(C) The ship would rise and fall gently over a period of many minutes.
(D) The ship would be sucked into a giant whirlpool.

230. The movement of water in the thermohaline circulation is slow, but it is a critical mechanism for:
(A) Transporting heat and regulating global climate.
(B) Generating daily tides.
(C) Creating surface waves.
(D) Triggering earthquakes.

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231. The shallow, gently sloping region of the ocean floor adjacent to a continent is the:
(A) Abyssal Plain
(B) Continental Rise
(C) Mid-Oceanic Ridge
(D) Continental Shelf

232. The primary cause of the semi-diurnal tidal cycle (two highs and two lows per day) is:
(A) The Sun's gravitational pull alone.
(B) The Earth's daily rotation through the two tidal bulges created by the Moon.
(C) The seasonal tilt of the Earth's axis.
(D) The interaction of wind and ocean currents.

233. The low-pressure center of a powerful cyclone is known as the:
(A) Eyewall
(B) Rainband
(C) Eye
(D) Front

234. In oceanography, the term "composition" primarily refers to the characteristics of:
(A) Marine life and ecosystems.
(B) Seafloor sediments and rocks.
(C) The shape and depth of the ocean basin.
(D) Temperature, density, and salinity of seawater.

235. The west coasts of continents in subtropical latitudes (e.g., Chile, California, NW Africa) are typically bordered by:
(A) Cold currents and have arid or semi-arid climates.
(B) Warm currents and have wet climates.
(C) No significant currents and have moderate climates.
(D) Poleward flowing currents and have stormy climates.

seawater.
(D) Decreases the density of the surrounding seawater.

145. The "eyewall" of a cyclone is the most dangerous part of the storm because it features:
(A) The highest wind speeds and most intense precipitation.
(B) The lowest atmospheric pressure and calmest winds.
(C) The highest storm surge, irrespective of wind.
(D) The beginning of the storm's dissipation phase.

146. The transition from the continental shelf to the deep ocean floor is marked by the:
(A) Coastline
(B) Abyssal plain
(C) Mid-oceanic ridge
(D) Continental slope

147. A warm, fast-flowing current in the Atlantic that originates in the Gulf of Mexico is the:
(A) Canary Current
(B) Gulf Stream
(C) North Atlantic Drift
(D) Labrador Current

148. Which two factors are most important in determining the density of seawater?
(A) Temperature and pressure
(B) Salinity and depth
(C) Temperature and salinity
(D) Light penetration and temperature

149. The catastrophic tsunami of December 2004 was generated by a massive earthquake in the:
(A) Atlantic Ocean
(B) Pacific Ocean
(C) Arctic Ocean
(D) Indian Ocean

150. A major cause of sea level rise in the 21st century is the thermal expansion of water. This is because:
(A) As water warms, it expands, taking up more volume.
(B) As water warms, it becomes saltier and thus more voluminous.
(C) Melting ice adds warm water to the ocean.
(D) Warm water dissolves more atmospheric gases, increasing its volume.

151. Arrange the following forms of ocean relief from shallowest to deepest on average:
1. Oceanic Trench
2. Continental Shelf
3. Abyssal Plain

Which of the following represents the correct sequence?
(A) 1, 3, 2
(B) 2, 3, 1
(C) 3, 2, 1
(D) 2, 1, 3

152. Identify the incorrect statement regarding ocean temperature.
(A) Isotherms are generally parallel to the latitudes.
(B) The annual range of temperature is higher in the open ocean than in enclosed seas.
(C) The temperature of the ocean surface is highest at the equator.
(D) Ocean currents can cause significant deviations in the pattern of isotherms.

153. Match List I with List II and select the correct answer using the options given below.
List I: (Ocean Current)
P. Benguela Current
Q. Brazil Current
R. Oyashio Current
S. Mozambique Current
List II: (Type)
1. Warm Current
2. Cold Current
(A) P-2, Q-1, R-2, S-1
(B) P-1, Q-2, R-1, S-2
(C) P-2, Q-1, R-1, S-2
(D) P-1, Q-2, R-2, S-1

154. What happens to a deep-water wave when it enters shallow water?
(A) Its speed increases, its wavelength increases, and its height decreases.
(B) Its speed increases, its wavelength decreases, and its height increases.
(C) Its speed decreases, its wavelength increases, and its height decreases.
(D) Its speed decreases, its wavelength decreases, and its height increases.

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(D) It is unaffected by the Coriolis force.

201. Which of the following conditions would result in the highest ocean water density?
(A) High temperature, high salinity
(B) Low temperature, high salinity
(C) High temperature, low salinity
(D) Low temperature, low salinity

202. The most significant destructive impact of a tsunami at the coast is caused by:
(A) The massive volume of water and its momentum.
(B) The high speed of the wave.
(C) The temperature difference of the water.
(D) The sound the wave makes.

203. A cyclone is a powerful storm characterized by a low-pressure center and:
(A) Outwardly spiraling winds.
(B) Winds that blow in a straight line.
(C) Inwardly spiraling winds.
(D) No wind at all in the center.

204. The continental shelf is widest when:
(A) The adjacent land is mountainous.
(B) A deep ocean trench is located just offshore.
(C) The coast is an active volcanic zone.
(D) The adjacent land is a broad coastal plain.

205. The primary factors that control the circulation of surface ocean currents are:
(A) Salinity and temperature.
(B) Tides and tsunamis.
(C) Wind and the Coriolis effect.
(D) Seafloor topography and gravity.

206. Arrange the following layers of the ocean from top to bottom based on their typical temperature profile in the tropics:
1. Deep Cold Zone
2. Surface Mixed Layer
3. Thermocline

Which of the following represents the correct order?
(A) 2, 3, 1
(B) 3, 2, 1
(C) 1, 3, 2
(D) 2, 1, 3

207. A tide that has two high and two low waters in a day, with a marked inequality in the height of the two, is called a:
(A) Diurnal tide
(B) Semi-diurnal tide
(C) Bore tide
(D) Mixed tide

208. The main hazard from a cyclone to ships at sea is:
(A) The extremely high waves and strong winds
(B) The storm surge
(C) The heavy rain
(D) The low atmospheric pressure

209. Consider the following statements about sea level changes:
1. Eustatic changes are global in nature.
2. Isostatic changes are local or regional.
3. The melting of sea ice contributes significantly to eustatic sea level rise.
4. Thermal expansion of ocean water is a major eustatic factor.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 2 and 4
(D) 1, 3 and 4

210. What property of seawater is measured in parts per thousand (‰)?
(A) Salinity
(B) Temperature
(C) Density
(D) Acidity

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211. The continuous underwater mountain chain that extends through all the world's oceans is the:
(A) Continental Shelf system
(B) Trench system
(C) Guyot and Seamount system
(D) Mid-Oceanic Ridge system

212. What is the fundamental cause of water movement in a tide?
(A) A difference in wind speed across the ocean.
(B) A difference in the gravitational pull on opposite sides of the Earth.
(C) A difference in water temperature from the equator to the poles.

167. Identify the correct pair:
(A) Continental Shelf - Deepest part of the ocean
(B) Abyssal Plain - Steepest gradient
(C) Oceanic Trench - Shallowest relief feature
(D) Mid-Ocean Ridge - Site of crustal formation

168. Which of the following factors contributes to the low salinity found in the Bay of Bengal?
(A) Large influx of freshwater from the Ganges and Brahmaputra rivers.
(B) High rate of evaporation.
(C) Lack of connection to the open ocean.
(D) Location near the North Pole.

169. The ocean layer where density increases rapidly with depth is the:
(A) Thermocline
(B) Halocline
(C) Pycnocline
(D) Photic zone

170. Which statement best describes the movement of a tsunami?
(A) It has a low wave height but very fast speed in the open ocean.
(B) It has a large wave height but slow speed in the open ocean.
(C) It moves at the same speed in both deep and shallow water.
(D) It is visible as a giant wave from aircraft over the deep ocean.

171. Consider the following statements about ocean relief features:
1. The continental shelf is an extension of the continent submerged under water.
2. The continental slope is characterized by a gentle gradient.
3. Abyssal plains are the flattest regions on Earth.
4. Oceanic trenches are associated with convergent plate boundaries.
5. Mid-ocean ridges are submerged mountain ranges.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3 and 4
(B) 1, 3, 4 and 5
(C) 2, 3, 4 and 5
(D) All are correct

172. The main effect of a warm ocean current on the climate of a coastal area is to make it:
(A) Colder and drier.
(B) Warmer and more humid.
(C) Warmer and drier.
(D) Colder and more humid.

173. The primary energy source for the formation of most ocean waves is:
(A) The Sun's gravity
(B) The Moon's gravity
(C) The wind
(D) Geothermal heat

174. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : Sea level has been rising over the past century.
Reason (R) : Global warming has led to the thermal expansion of ocean water and the melting of glaciers and ice sheets.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

175. The Atacama Desert on the coast of Chile and Peru is extremely arid, primarily due to the influence of the:
(A) Warm Brazil Current
(B) Equatorial Counter Current
(C) Cold Peru (Humboldt) Current
(D) South Atlantic Gyre

176. A tide with two high tides and two low tides each day, with the two high tides being of approximately equal height, is a:
(A) Diurnal tide
(B) Semi-diurnal tide
(C) Mixed tide
(D) Neap tide

177. The 'fetch' of a wind, the 'duration' of the wind, and the 'speed' of the wind are the three key factors that determine the:
(A) Direction of ocean currents
(B) Salinity of the surface water

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155. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : The tidal range is greatest during spring tides.

Reason (R) : During spring tides, the gravitational forces of the Sun and the Moon are aligned and work together.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

156. The most prominent feature of the floor of the Atlantic Ocean is the:
(A) Mariana Trench
(B) Mid-Atlantic Ridge
(C) East Pacific Rise
(D) Great Barrier Reef

157. Which of the following is a primary control on the worldwide distribution of ocean surface salinity?
(A) The influence of depth and pressure.
(B) The distribution of marine life.
(C) Local differences in current speed.
(D) The difference between evaporation and precipitation.

158. Consider the following statements about cyclones:
1. A cyclone's rotation is counter-clockwise in the Northern Hemisphere.
2. The central pressure in a cyclone is very high.
3. Cyclones dissipate over warm ocean water.
4. Storm surge is a rise in sea level independent of the tide.

Which of the above statement(s) is/are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3
(D) 2, 3 and 4

159. The boundary between the continental shelf and the continental slope is known as the:
(A) Shoreline
(B) Continental rise
(C) Shelf break
(D) Abyssal front

160. The "Great Ocean Conveyor Belt" is a simplified model of the:
(A) Surface gyres
(B) Thermohaline circulation
(C) Equatorial counter-currents
(D) Tidal patterns

161. A tsunami is a series of waves with a very long:
(A) Wave height in the open ocean.
(B) Wavelength.
(C) Wave period in shallow water.
(D) Fetch.

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162. A tide that occurs once a day is called a:
(A) Diurnal tide
(B) Mixed tide
(C) Semi-diurnal tide
(D) Spring tide

163. The addition of large amounts of freshwater into the North Atlantic could potentially slow down or stop the thermohaline circulation by:
(A) Increasing the density of surface water.
(B) Making the water too cold to sink.
(C) Preventing surface water from becoming dense enough to sink.
(D) Increasing the salinity of the surface water.

164. Isolated, steep-sided volcanic peaks on the ocean floor are called:
(A) Guyots
(B) Trenches
(C) Abyssal hills
(D) Seamounts

165. The primary cause of the difference in the timing of tides from day to day is:
(A) The Earth's rotation on its axis.
(B) The Earth's revolution around the Sun.
(C) The Moon's revolution around the Earth.
(D) The changing seasons.

166. A hurricane in the North Atlantic will typically have its winds rotating:
(A) Clockwise
(B) Counter-clockwise
(C) Inward towards the center without rotation
(D) Outward from the center without rotation

force.

Which of the above statement(s) is/are correct?

(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 3 and 4
(D) 1, 2 and 4

191. The primary requirement for the formation of a tropical cyclone is:

(A) Cold ocean water below 20°C.
(B) Strong wind shear through the atmosphere.
(C) A source of warm, moist air over a tropical ocean.
(D) A large landmass to provide focus.

192. Which of the following best describes the water motion in a deep-water wave?

(A) Water particles move forward with the wave.
(B) Water particles move in circular orbits that get smaller with depth.
(C) Water particles move up and down only.
(D) Water particles remain completely still.

193. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : Regions where cold ocean currents are found, like the coast of Peru, are often major fishing areas.

Reason (R) : The cold currents are associated with upwelling, which brings nutrient-rich deep water to the surface, supporting large phytoplankton populations.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

194. The tidal range is minimal during:

(A) Spring tides
(B) Full moon
(C) New moon
(D) Neap tides

195. The flat, sediment-covered areas of the deep ocean floor are known as:

(A) Abyssal plains
(B) Continental shelves
(C) Mid-ocean ridges
(D) Seamounts

196. The salinity of ocean water is lowest in the:

(A) Subtropical regions due to high evaporation.
(B) Both A and C are correct for different reasons.
(C) Equatorial regions due to high rainfall.
(D) Polar regions due to melting ice and low evaporation.

197. A tsunami generated by a landslide is an example of a hazard triggered by:

(A) An atmospheric event
(B) A meteorological event
(C) A geophysical event
(D) A biological event

198. Match List I with List II and select the correct answer using the options given below.

List I: (Term)

P. Crest
Q. Trough
R. Wave Height
S. Wavelength

List II: (Description)

1. Lowest point of a wave
2. Highest point of a wave
3. Distance between two crests
4. Vertical distance from trough to crest

(A) P-2, Q-1, R-4, S-3
(B) P-1, Q-2, R-4, S-3
(C) P-2, Q-1, R-3, S-4
(D) P-4, Q-3, R-2, S-1

199. Isostatic adjustment refers to:

(A) The global rise and fall of sea level.
(B) The change in ocean temperature due to climate change.
(C) The vertical movement of the Earth's crust in response to loading or unloading.
(D) The deflection of currents by the Earth's rotation.

200. The circulation of the Indian Ocean is unique because:

(A) It is the only ocean that possesses no warm surface currents.
(B) Land-blocked to the north with seasonally reversing circulation patterns.
(C) It is the only ocean with a mid-ocean ridge.

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134. Which statement accurately describes the relationship between temperature, salinity, and density of seawater?
(A) Density increases as temperature increases or salinity decreases.
(B) Density decreases as temperature decreases or salinity increases.
(C) Density is completely independent of temperature and salinity.
(D) Density decreases as temperature increases or salinity decreases.

135. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The Pacific Ocean is fringed by a 'Ring of Fire' characterized by numerous trenches, volcanoes, and earthquakes.
Reason (R) : The margins of the Pacific Ocean are zones of active tectonic plate convergence and subduction.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

136. The movement of sand along a beach in a zigzag pattern is caused by:
(A) Tides
(B) The swash and backwash of waves approaching the shore at an angle.
(C) The longshore current.
(D) The action of rip currents.

137. Which of the following is a key characteristic of a tsunami in the open ocean?
(A) Extremely high wave height.
(B) Very high speed of propagation.
(C) Very short wavelength.
(D) A steep and breaking wave front.

138. Consider the following statements about ocean currents:
1. They are responsible for transferring heat from the equator to the poles.
2. The meeting of warm and cold currents often creates dense fog.
3. Cold currents on the west coasts of continents contribute to arid conditions.
4. Deep ocean currents are primarily driven by wind.
5. Ocean gyres rotate clockwise in the Southern Hemisphere.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 1, 3, and 5 only
(C) 2, 4, and 5 only
(D) 1, 2, 3, 4 and 5

139. The abyssal zone of the ocean is characterized by all of the following EXCEPT:
(A) Extreme pressure
(B) Absence of sunlight
(C) Low temperatures
(D) Abundant plant life

140. The Coriolis force is an apparent force that arises due to:
(A) Earth's gravity
(B) Earth's magnetic field
(C) Earth's rotation
(D) Earth's revolution around the sun

141. The lowest point of a wave is called the:
(A) Crest
(B) Trough
(C) Height
(D) Period

142. The difference in height between high tide and low tide is called the:
(A) Tidal period
(B) Tidal bore
(C) Tidal current
(D) Tidal range

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143. Which of the following would cause a local, or isostatic, fall in sea level?
(A) Tectonic uplift of a coastal region.
(B) Melting of the Greenland ice sheet.
(C) Thermal expansion of the upper ocean.
(D) Global warming.

144. The formation of sea ice in polar regions:
(A) Decreases the salinity of the surrounding seawater.
(B) Has no effect on the salinity of the surrounding seawater.
(C) Increases the salinity of the surrounding

(D) A difference in atmospheric pressure over land and sea.

213. The following question consists of two statements — Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : Tropical cyclones weaken and dissipate over land.
Reason (R) : Over land, they are cut off from their primary energy source, which is the warm, moist air from the ocean.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

214. The California Current is a cold current that flows south along the west coast of North America. What is its warm-water counterpart on the west coast of the Pacific?
(A) Oyashio Current
(B) Peru Current
(C) East Australian Current
(D) Kuroshio Current

215. The horizontal flow of water in the ocean is called a current. The vertical flow of water is called:
(A) Upwelling or downwelling
(B) Advection
(C) A gyre
(D) A tide

216. A long, narrow, and very deep depression in the ocean floor is known as a:
(A) Submarine Canyon
(B) Oceanic Trench
(C) Mid-oceanic ridge
(D) Continental Rise

217. The density of seawater is a function of its temperature, salinity, and:
(A) Color
(B) Pressure
(C) Clarity
(D) Age

218. The immediate withdrawal of water from a beach, exposing the sea floor, is a sign of an impending:
(A) Tsunami
(B) Storm surge
(C) High tide
(D) Rip current

219. The "El Niño" phenomenon is characterized by the appearance of unusually warm water in the central and eastern equatorial:
(A) Atlantic Ocean
(B) Indian Ocean
(C) Pacific Ocean
(D) Arctic Ocean

220. Consider the following statements regarding waves and tides:
1. Wind is the primary generating force for both waves and tides.
2. Tides have a much longer wavelength than wind-driven waves.
3. The energy of a wave is related to its height.
4. Tides are caused by the gravitational attraction of the Sun and Moon.
5. Wave motion in deep water involves a significant net transport of water.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 3, 4 and 5
(D) 1, 4 and 5

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221. The Benguela current on the west coast of Africa is a:
(A) Warm current flowing poleward.
(B) Warm current flowing equatorward.
(C) Cold current flowing poleward.
(D) Cold current flowing equatorward.

222. The term 'isotherm' refers to a line on a map connecting points of equal:
(A) Temperature
(B) Depth
(C) Salinity
(D) Pressure

223. What type of ocean relief feature would you be traversing if you were to descend from a continent's edge to the deep ocean floor?
(A) Shelf, Rise, Slope, Plain

(C) Timing of the tides
(D) Height of the waves generated

178. The deepest known point in the Earth's oceans is the Challenger Deep, located in the:
(A) Mariana Trench
(B) Mid-Atlantic Ridge
(C) Java Trench
(D) Peru-Chile Trench

179. The term for the composition of ocean water, focusing on temperature, density, and salinity is a study of its:
(A) Morphology
(B) Tectonic setting
(C) Hydrographic properties
(D) Biological community

180. The most immediate and life-threatening hazard associated with a cyclone for a low-lying coastal community is typically the:
(A) Storm surge
(B) Wind
(C) Rain
(D) Lightning

181. Which pair is incorrectly matched regarding ocean currents?
(A) Kuroshio - Warm
(B) Gulf Stream - Warm
(C) Benguela - Cold
(D) Agulhas - Cold

182. A eustatic fall in sea level could be caused by:
(A) The thermal expansion of water.
(B) The formation of large continental ice sheets.
(C) The subsidence of a coastline.
(D) The melting of glaciers.

183. The vertical circulation of ocean water, involving the sinking of cold, dense water and the rising of warmer water, is a process of:
(A) Advection
(B) Radiation
(C) Convection
(D) Diffusion

184. The zone of rapid temperature change that acts as a barrier between warm surface water and cold deep water is the:
(A) Pycnocline
(B) Halocline
(C) Isotherm
(D) Thermocline

185. The Pacific Tsunami Warning Center (PTWC) is most concerned with monitoring:
(A) Underwater seismic events.
(B) Ocean temperature anomalies.
(C) Atmospheric pressure changes.
(D) Wind speeds over the ocean.

186. The North Atlantic Gyre is a large system of circulating currents. Which of the following is NOT part of this gyre?
(A) Gulf Stream
(B) Benguela Current
(C) Canary Current
(D) North Equatorial Current

187. The regular pattern of tides, with a period of approximately 12 hours and 25 minutes for a semi-diurnal tide, is primarily governed by the:
(A) Seasonal tilt of the Earth.
(B) Rotation of the Earth and the orbit of the Moon.
(C) Speed of the thermohaline circulation.
(D) Path of the sun across the sky.

188. Submarine canyons, which are deep V-shaped valleys, are often found cutting across the:
(A) Continental shelf and slope
(B) Mid-oceanic ridge
(C) Abyssal plain
(D) Top of a guyot

189. The freezing point of seawater is:
(A) Higher than that of freshwater.
(B) The same as that of freshwater (0°C).
(C) Lower than that of freshwater.
(D) Dependent on pressure but not salinity.

190. Consider the following statements about ocean currents:
1. Warm currents are denser than cold currents.
2. Cold currents generally flow towards the equator.
3. The mixing of warm and cold currents creates ideal fishing grounds.
4. Ocean currents are deflected by the Coriolis

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236. The most significant factor that creates large waves is:
(A) A sudden change in water temperature.
(B) A strong wind blowing for a long time over a large area.
(C) The gravitational pull of the moon.
(D) An underwater earthquake.

237. A rise in global sea level caused by the melting of the Antarctic ice sheet is an example of a:
(A) Isostatic change
(B) Eustatic change
(C) Tectonic change
(D) Local subsidence

238. Which statement is true regarding the density of seawater?
(A) Increasing pressure increases density.
(B) Increasing temperature increases density.
(C) Increasing salinity decreases density.
(D) Density is at its maximum at 0°C for all salinities.

239. The most common generating force for tsunamis is:
(A) Horizontal displacement of the seafloor during an earthquake.
(B) The strong winds of a typhoon.
(C) Vertical displacement of the seafloor during an earthquake.
(D) The collapse of a large wave.

240. The boundary separating the warm surface water from the cold deep water in the ocean is the:
(A) Halocline
(B) Pycnocline
(C) Isoline
(D) Thermocline

241. The largest and deepest ocean basin on Earth is the:
(A) Atlantic Ocean
(B) Indian Ocean
(C) Pacific Ocean
(D) Arctic Ocean

242. Spring tides occur during which lunar phases?
(A) First and Third Quarter
(B) New Moon and Full Moon
(C) Waxing and Waning Crescent
(D) Only during the Full Moon

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243. The energy for a tropical cyclone is derived from:
(A) The kinetic energy of the Earth's rotation.
(B) The sensible heat from the dry desert air.
(C) The latent heat of condensation of water vapor.
(D) The geothermal heat from the ocean floor.

244. The gradual sinking of a delta due to the weight of accumulated sediment is an example of:
(A) Eustatic sea level rise
(B) Tectonic uplift
(C) Global warming
(D) Isostatic subsidence

245. Identify the INCORRECT pair.
(A) Gulf Stream - Warm Current
(B) Peru Current - Cold Current
(C) Brazil Current - Cold Current
(D) Canary Current - Cold Current

246. The Mid-Atlantic Ridge is a classic example of a:
(A) Convergent plate boundary
(B) Divergent plate boundary
(C) Transform fault boundary
(D) Subduction zone

247. If the Earth did not rotate, surface ocean currents would tend to flow:
(A) In large circular gyres.
(B) Primarily in a simple north-south direction driven by temperature differences.
(C) Randomly with no discernible pattern.
(D) Parallel to the wind direction.

248. The height of a wave is the vertical distance between its:
(A) Crest and trough.
(B) Crest and the still water level.
(C) Trough and the still water level.
(D) Two adjacent crests.

249. Which of the following hazards is defined as a series of long-wavelength ocean waves generated by the displacement of a large volume of water?
(A) Cyclone
(B) Storm Surge
(C) Tsunami
(D) Tide

ANSWERS

1. (B) The gently sloping submerged extension of a continent.
The continental shelf represents the shallowest part of the ocean basin, forming a gradual seaward extension of the landmass. This submerged portion of the continental crust usually slopes gently from the shoreline toward the shelf break. It is characterized by shallow waters and often contains significant natural resources. These regions are biologically productive and play a vital role in marine ecosystems and human economic activities.

2. (A) 35 parts per thousand (ppt).
Salinity measures the total concentration of dissolved salts in seawater, typically expressed in parts per thousand. While local values vary based on evaporation, precipitation, and river runoff, the global mean is approximately thirty-five parts per thousand. This value remains relatively stable across open ocean basins. Understanding these levels is crucial for studying water density, global circulation patterns, and the biological adaptations of marine organisms.

3. (C) Kuroshio Current
Ocean currents are categorized as warm or cold based on their temperature relative to surrounding waters. The Kuroshio Current is a major warm western boundary current in the North Pacific Ocean. It transports tropical waters northward toward the higher latitudes, significantly influencing the climate of Japan and surrounding regions. In contrast, currents like the Labrador or Benguela move colder water from polar regions toward the equator.

4. (A) P-4, Q-2, R-3, S-1
Oceanic features are defined by distinct topographical characteristics found across the sea floor. The continental slope represents the steep descent from the shelf toward the deep ocean. Abyssal plains are vast, flat regions covering much of the deep ocean floor. Mid-oceanic ridges consist of continuous underwater mountain chains formed by tectonic activity. Oceanic trenches are identified as deep, narrow depressions marking subduction zones where crust is recycled.

5. (C) The gravitational pull of the Moon and the Sun on the Earth.
Tides are the periodic rise and fall of sea levels caused by the complex gravitational interactions within the Earth-Moon-Sun system. The Moon exerts the strongest influence due to its proximity to Earth, while the Sun also contributes significantly despite its distance. This gravitational attraction creates bulges in the ocean water. As Earth rotates through these bulges, coastal regions experience the rhythmic cycle of high and low tides.

6. (B) Submarine earthquakes or volcanic eruptions.
Tsunamis are massive seismic sea waves generated by large-scale displacements of water in the ocean basin. These events are most commonly triggered by powerful submarine earthquakes occurring at subduction zones. Other causes include underwater volcanic eruptions or landslides that abruptly move significant volumes of water. Unlike wind-driven waves, tsunamis involve the movement of the entire water column and can travel across entire oceans at high speeds.

7. (D) The temperature of ocean water is uniform from the surface to the bottom.
Ocean temperature varies significantly both horizontally across latitudes and vertically with depth. Solar radiation primarily warms the surface layers, creating a warm mixed layer. Below this, the thermocline marks a region of rapid temperature decrease. In the deep ocean, temperatures remain consistently cold and near freezing. Therefore, the assumption that water maintains a uniform temperature from the surface to the seafloor is inaccurate due to vertical stratification.

8. (A) Both A and R are true and R is the correct explanation of A.
The density of seawater is fundamentally determined by its temperature and salinity levels. When salts dissolve in water, they increase the

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typically found adjacent to continents or island arcs. Trenches are associated with convergent plate boundaries where one tectonic plate subducts beneath another. Another set of features are Seamounts and Guyots. Seamounts are submerged mountains of volcanic origin, rising sharply from the seafloor but not reaching the ocean's surface. They are essentially underwater volcanoes. Guyots, also known as tablemounts, are flat-topped seamounts. It is hypothesized that they were once volcanic islands that rose above sea level, were eroded flat by wave action, and subsequently subsided below the surface. These varied features highlight the dynamic geological processes that continuously shape the ocean basins.

Based on the above source, attempt the following five questions.

256. Which ocean relief feature is characterized by its association with convergent plate boundaries and represents the deepest parts of the ocean?
(A) Mid-Oceanic Ridge
(B) Oceanic Trench
(C) Seamount
(D) Guyot

257. Mid-Oceanic Ridges are primarily formed by which geological process?
(A) Subduction of an oceanic plate beneath a continental plate
(B) Erosion of volcanic islands by wave action
(C) Accumulation of sediment at the base of a continental slope
(D) Divergence of tectonic plates and creation of new crust

258. What is the key morphological difference between a Seamount and a Guyot?
(A) A Seamount has a pointed peak, while a Guyot has a flat top.
(B) A Seamount is volcanic, while a Guyot is sedimentary.
(C) A Seamount is found at divergent boundaries, while a Guyot is at convergent boundaries.
(D) A Seamount is an isolated feature, while a Guyot is part of a chain.

259. The hypothesis regarding the formation of Guyots suggests a sequence of events. Which option best describes this sequence?
(A) Subsidence, followed by volcanic eruption and erosion
(B) Tectonic uplift, followed by subsidence and sediment deposition
(C) Volcanic emergence, wave erosion, and subsequent subsidence
(D) Submarine eruption, followed by plate convergence and uplift

260. According to the passage, a central rift valley is a common feature found along the crest of which landform?
(A) Mid-Oceanic Ridges
(B) Continental Slopes
(C) Oceanic Trenches
(D) Abyssal Plains

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Direction : Please read the following source carefully.

The temperature of ocean water is a fundamental property that varies both horizontally across the surface and vertically with depth. The horizontal distribution of temperature is primarily controlled by latitude, as the amount of incoming solar radiation decreases from the equator towards the poles. However, this latitudinal pattern is significantly modified by other factors. The unequal distribution of land and water plays a crucial role; oceans in the Northern Hemisphere receive more heat due to their greater contact with large landmasses compared to the Southern Hemisphere. Prevailing winds influence temperatures by dragging surface water with them; winds blowing from land towards oceans can cause upwelling of cold water from below, while onshore winds can pile up warm surface water near the coast. Ocean currents are another major modifier, acting as vast conduits for heat transfer. Warm currents, such as the Gulf Stream, transport tropical heat to higher latitudes, making regions like Western Europe warmer than they would otherwise be. Conversely, cold currents, like the Labrador Current, bring cold water from polar regions towards the equator, moderating temperatures in adjacent coastal areas. The interplay of these factors creates a complex mosaic of sea surface temperatures, deviating from a simple latitudinal gradient.

250. The circulation of the deep ocean is primarily driven by:
(A) Density differences
(B) Wind
(C) Earth's rotation
(D) Gravitational pull of the moon

Direction : Please read the following source carefully.

The relief of the ocean basins is complex and can be broadly categorized into four major divisions, each with distinct characteristics. The first division is the Continental Shelf, which is the submerged extension of a continent, characterized by a gentle gradient of about 1° or less. It is a zone of significant economic importance due to its rich fishing grounds, mineral resources, and petroleum deposits. Following the shelf is the Continental Slope, where the seafloor descends steeply, marking the true edge of the continental block. The gradient of the slope is much sharper, typically varying between 2° and 5°. This zone often features submarine canyons, which are deep gorges cut into the slope, believed to be formed by turbidity currents. The third division is the Continental Rise, located at the base of the continental slope. It is an area of deposition where sediments from the continent, transported down the slope, accumulate in a large, gently sloping apron. Its gradient is considerably less than that of the slope. Beyond the continental rise lies the fourth and most extensive division, the Deep Sea Plain or Abyssal Plain. These are exceptionally flat, featureless plains of the deep ocean floor, covered with fine-grained sediments like clay and silt.

Based on the above source, attempt the following five questions.

251. Which division of the ocean floor is described as the true edge of the continental block and is characterized by a steep gradient?
(A) The Continental Rise
(B) The Continental Slope
(C) The Continental Shelf
(D) The Abyssal Plain

252. What is the primary reason for the economic significance of the Continental Shelf?
(A) Its rich biological and mineral resources
(B) Its great depth and pressure
(C) The presence of submarine canyons
(D) The prevalence of turbidity currents

253. According to the passage, how are the submarine canyons found on the Continental Slope likely formed?
(A) By volcanic activity originating from the seafloor
(B) By the accumulation of continental sediments
(C) By the erosional action of turbidity currents
(D) By the tectonic spreading of the seafloor

254. Based on the description, what is the correct sequence of ocean floor divisions when moving from the coast towards the deep ocean?
(A) Continental Slope, Continental Shelf, Continental Rise, Abyssal Plain
(B) Continental Shelf, Continental Rise, Continental Slope, Abyssal Plain
(C) Abyssal Plain, Continental Rise, Continental Slope, Continental Shelf
(D) Continental Shelf, Continental Slope, Continental Rise, Abyssal Plain

255. The Abyssal Plain is distinguished from other divisions by which of the following characteristics?
(A) A sharp, steep gradient
(B) Being an area of active deposition from the continent
(C) Its exceptional flatness and fine-grained sediment cover
(D) Its status as the submerged extension of a continent

Direction : Please read the following source carefully.

Beyond the major divisions of the ocean floor, several minor but significant relief features contribute to the complexity of marine topography. Mid-Oceanic Ridges represent one of the most prominent features, forming an interconnected chain of mountain systems within the oceans. These ridges are seismically and volcanically active, marking zones of plate divergence where new oceanic crust is formed. A central rift valley often runs along the crest of these ridges. In contrast, Oceanic Deeps or Trenches are the deepest parts of the oceans. They are long, narrow, and steep-sided depressions that are

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(A) it is composed of dense water that sinks in polar regions.
(B) it is in direct contact with the cold ocean floor.
(C) it experiences intense pressure that lowers its temperature.
(D) it is where seasonal temperature variations are most extreme.

269. In which region is the thermocline described as a permanent feature?
(A) Polar oceans
(B) Mid-latitude oceans
(C) Tropical oceans
(D) Coastal shelf waters

270. The upper layer of the ocean maintains relatively uniform warm temperatures due to which processes?
(A) Geothermal heating from the ocean floor
(B) Upwelling of warm water from the deep ocean
(C) Chemical reactions releasing heat into the water
(D) Solar radiation and wind-induced mixing

Direction : Please read the following source carefully.

Salinity, the measure of the total amount of dissolved salts in seawater, is a critical property influencing ocean circulation, density, and marine ecosystems. It is typically expressed in parts per thousand (‰). The average salinity of the open ocean is about 35‰, but this value varies geographically due to the interplay of several factors that either add or remove freshwater. The primary factor increasing salinity is evaporation, which removes water and leaves the salts behind, a process that is most intense in subtropical regions with high temperatures and low rainfall. Conversely, precipitation is the main factor that decreases salinity by adding freshwater directly to the ocean surface. The inflow of freshwater from rivers also significantly lowers salinity in coastal areas and enclosed seas, such as the Baltic Sea. In polar regions, the formation of sea ice (freezing) increases the salinity of the remaining unfrozen water, as salt is expelled during the freezing process. Conversely, the melting of sea ice in spring and summer releases freshwater and decreases surface salinity. The vertical distribution of salinity can also show stratification, with a zone of rapid salinity change with depth known as the halocline. Isohalines are lines on a map connecting points of equal salinity.

Based on the above source, attempt the following five questions.

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271. Which of the following processes leads to an increase in ocean salinity?
(A) The melting of sea ice
(B) The inflow of river water
(C) The formation of sea ice
(D) High levels of precipitation

272. According to the passage, in which region is evaporation most intense, leading to higher surface salinity?
(A) Polar regions
(B) Subtropical regions
(C) Equatorial regions with high rainfall
(D) Coastal areas near large rivers

273. A halocline is defined as a zone in the ocean where:
(A) temperature changes rapidly with depth.
(B) density remains constant with depth.
(C) pressure is at its maximum.
(D) salinity changes rapidly with depth

274. The significantly lower salinity of the Baltic Sea can be attributed primarily to which factor?
(A) A large inflow of freshwater from rivers
(B) High rates of evaporation
(C) The frequent formation of sea ice
(D) Limited connection to the open ocean and low precipitation

275. What is the term for lines on a map that connect points of equal salinity?
(A) Isobars
(B) Isotherms
(C) Isohalines
(D) Isoclines

Direction : Please read the following source carefully.

The density of ocean water is a crucial physical property that is not constant but varies with location and depth, primarily as a function of its temperature and salinity. A third factor, pressure, also affects density, but its influence is most significant only in the great depths of the ocean,

where it compresses water molecules slightly. For most oceanographic purposes, temperature and salinity are the dominant controls. The relationship is straightforward: density increases as temperature decreases and as salinity increases. Therefore, the densest water in the open ocean is typically found in high-latitude regions where the water is very cold and has become more saline due to sea ice formation. This cold, salty, and dense water tends to sink and flow towards the equator along the ocean bottom, forming the basis of deep-ocean thermohaline circulation. Conversely, warm, less saline water is less dense and remains at the surface. The vertical stratification of the ocean is often characterized by a pycnocline, which is a layer where density increases rapidly with depth. This layer acts as a significant barrier to vertical mixing, much like the thermocline (for temperature) and halocline (for salinity), and often coincides with them.

Based on the above source, attempt the following five questions.

276. According to the passage, which two factors are the dominant controls on ocean water density?
(A) Temperature and salinity
(B) Pressure and depth
(C) Latitude and longitude
(D) Wind speed and wave action

277. The densest ocean water is most likely to be found in which of the following conditions?
(A) Warm and highly saline water
(B) Warm and low-salinity water
(C) Cold and low-salinity water
(D) Cold and highly saline water

278. What is a pycnocline?
(A) A layer where temperature increases rapidly with depth
(B) A layer where density increases rapidly with depth
(C) A layer where salinity remains constant with depth
(D) A layer where pressure decreases rapidly with depth

279. The passage states that the influence of pressure on water density is most significant under what condition?
(A) In warm surface waters
(B) In areas of high evaporation
(C) In the great depths of the ocean
(D) In shallow coastal regions

280. The sinking of cold, dense water in high-latitude regions is a fundamental driver of what process?
(A) The formation of surface waves
(B) The daily tidal cycle
(C) The generation of tsunamis
(D) The thermohaline circulation

Direction : Please read the following source carefully.

Ocean circulation is a continuous and complex movement of seawater, driven by a combination of forces and categorized into surface and deep currents. Surface currents, which occur in the upper few hundred meters of the ocean, are primarily driven by the friction of planetary winds blowing over the water. The pattern of these currents is significantly modified by the Earth's rotation through the Coriolis force, which deflects moving water to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This deflection results in large, circular current systems known as gyres. These currents are also influenced by differences in water temperature and salinity. Currents originating in low latitudes are warm and flow towards the poles along the western sides of ocean basins, while currents originating in high latitudes are cold and flow towards the equator along the eastern sides. For example, the warm Kuroshio Current and the cold California Current are parts of the North Pacific gyre. Deep-water circulation, or thermohaline circulation, is driven by density differences arising from variations in temperature (thermo) and salinity (haline). This process involves the sinking of cold, saline, dense water in polar regions, which then spreads slowly throughout the global ocean basins at great depths.

Based on the above source, attempt the following five questions.

281. What is the primary driving force behind the ocean's surface currents?
(A) Friction from planetary winds
(B) Gravitational pull from the Moon and Sun
(C) Density differences due to temperature and salinity
(D) Geothermal heat from the ocean floor

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282. The Coriolis force causes a deflection of moving water to which direction in the Southern Hemisphere?
(A) To the right
(B) To the left
(C) Towards the pole
(D) Towards the equator

283. Thermohaline circulation is driven primarily by which of the following?
(A) Wind patterns and the Coriolis force
(B) Differences in water density
(C) The shape of the ocean basins
(D) Submarine volcanic activity

284. Based on the general pattern described, a current flowing towards the equator along the eastern side of an ocean basin would most likely be classified as:
(A) a cold current.
(B) a warm current.
(C) a deep current.
(D) a counter-equatorial current.

285. Large, circular surface current systems that dominate the major ocean basins are known as:
(A) Tides.
(B) Eddies.
(C) Gyres.
(D) Upwellings.

Direction : Please read the following source carefully.

The ocean surface is in a constant state of motion, with waves and tides being two of the most significant forms of circulation. Ocean waves are primarily generated by the transfer of energy from wind blowing across the water surface. The size of a wave depends on the wind's speed, its duration, and the fetch (the distance over which the wind blows). Key characteristics used to describe a wave include its crest (the highest point), trough (the lowest point), height (the vertical distance between crest and trough), and wavelength (the horizontal distance between two successive crests). As a wave passes, the water particles move in a circular or orbital motion, but there is little net forward movement of the water itself; it is the wave form and energy that propagates. Tides, in contrast, are the periodic rise and fall of sea level and are caused by the gravitational forces exerted by the Moon and, to a lesser extent, the Sun. The gravitational pull of the Moon creates two tidal bulges on opposite sides of the Earth, resulting in two high tides and two low tides each day (a semi-diurnal cycle). When the Sun, Moon, and Earth are aligned (during full and new moons), their combined gravitational pull creates larger tidal ranges known as Spring Tides. When they are at right angles to each other, the pulls partially cancel out, resulting in smaller tidal ranges called Neap Tides.

Based on the above source, attempt the following five questions.

286. What is the primary cause of most ocean waves?
(A) Gravitational pull of the Moon
(B) Submarine earthquakes
(C) Differences in water density
(D) Energy transfer from wind

287. Spring Tides, which feature a large tidal range, occur under which astronomical condition?
(A) When the Sun and Moon are at right angles relative to the Earth
(B) When the Earth is at its closest point to the Sun
(C) When the Sun, Moon, and Earth are in alignment
(D) When the Moon is at its farthest point from the Earth

288. Which term describes the horizontal distance between two successive wave crests?
(A) Wave height
(B) Wavelength
(C) Wave period
(D) Fetch

289. The passage explains that as a wave propagates across the ocean, what is actually moving forward over long distances?
(A) The water particles in a linear path
(B) The seabed sediment
(C) The entire body of water from one point to another
(D) The wave form and its energy

290. Neap Tides are characterized by smaller tidal ranges and are caused by:
(A) the gravitational forces of the Sun and Moon being at right angles.

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(B) the alignment of the Sun, Moon, and Earth.
(C) strong offshore winds opposing the tidal pull.
(D) the Earth's rotation speed being at its minimum.

Direction : Please read the following source carefully.

Sea level is not static but changes over various timescales due to a range of geological and climatic factors. These fluctuations are broadly classified as either eustatic or isostatic. Eustatic sea level change refers to a global change in the volume of water in the oceans, leading to a worldwide rise or fall in sea level. The primary driver of eustatic change is variation in global climate. During ice ages, vast quantities of water are locked up in continental ice sheets, causing a global fall in sea level. Conversely, during warmer interglacial periods, the melting of these ice sheets and thermal expansion of ocean water (as it warms) cause a global sea level rise. Contemporary climate change, driven by anthropogenic warming, is currently causing a significant eustatic rise. In contrast, isostatic sea level change is a local or regional phenomenon resulting from the vertical movement of the land, not a change in ocean water volume. A key cause is glacial isostasy: the immense weight of an ice sheet depresses the Earth's crust, and when the ice melts, the crust slowly rebounds upward over thousands of years, causing a local fall in sea level relative to the land. Tectonic activity, such as uplift or subsidence along coastlines, can also cause localized isostatic sea level changes.

Based on the above source, attempt the following five questions.

291. A worldwide rise in sea level caused by the melting of continental ice sheets is an example of what type of change?
(A) Isostatic change
(B) Tectonic change
(C) Eustatic change
(D) Diurnal change

292. What is the fundamental difference between eustatic and isostatic sea level changes?
(A) Eustatic change involves a change in ocean water volume, while isostatic change involves land movement.
(B) Eustatic change is rapid, while isostatic change is slow.
(C) Eustatic change is localized, while isostatic change is global.
(D) Eustatic change is caused by climate, while isostatic change is caused by tides.

293. According to the passage, what is the primary cause of contemporary eustatic sea level rise?
(A) Increased river discharge into the oceans
(B) Glacial isostatic rebound
(C) Tectonic subsidence of ocean basins
(D) Anthropogenic warming and its effects

294. Glacial isostasy involves the upward rebound of the Earth's crust after an ice sheet melts. What is the resulting effect on the local sea level?
(A) A rise in local sea level
(B) A fall in local sea level relative to the land
(C) No change in the local sea level
(D) A temporary fluctuation with no net change

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295. Besides the melting of ice sheets, what other factor contributes to eustatic sea level rise during warm periods?
(A) Increased precipitation over the oceans
(B) Decreased evaporation from the ocean surface
(C) The thermal expansion of ocean water
(D) Subsidence of the ocean floor

Direction : Please read the following source carefully.

Oceans can be the source of formidable natural hazards, with tsunamis and tropical cyclones being two of the most destructive. A tsunami is a series of powerful ocean waves with extremely long wavelengths, generated by a large-scale disturbance of the water column. The most common cause is a submarine earthquake, particularly those occurring at convergent plate boundaries where vertical displacement of the seafloor abruptly displaces a massive volume of water. Volcanic eruptions and large submarine landslides can also trigger tsunamis. In the deep ocean, a tsunami wave may have a small height but travels at very high speeds. As it approaches a coastline and enters shallower water, its speed decreases, and its height increases dramatically, leading to catastrophic coastal inundation. Tropical cyclones (known as hurricanes or

typhoons in different regions) are intense, rotating storm systems that form exclusively over warm ocean waters, typically above 26.5°C. Their formation requires not only warm sea surface temperatures to provide heat and moisture but also the presence of the Coriolis force to initiate rotation; hence, they do not form at the equator. The hazards associated with cyclones include destructive high-velocity winds, torrential rainfall leading to flooding, and a storm surge, which is an abnormal rise of sea level pushed towards the coast by the storm's winds.

Based on the above source, attempt the following five questions.

296. What is the most frequent cause of the generation of a tsunami?
(A) A tropical cyclone's storm surge
(B) The alignment of the Sun and Moon
(C) The melting of a large iceberg
(D) A large submarine earthquake

297. Tropical cyclones do not form at the equator primarily due to the absence of which necessary condition?
(A) A significant Coriolis force
(B) High sea surface temperatures
(C) Sufficient atmospheric moisture
(D) High atmospheric pressure

298. How does a tsunami wave's behavior change as it approaches a coastline?
(A) Its speed increases, and its height decreases.
(B) Its speed decreases, and its height increases.
(C) Both its speed and height decrease.
(D) Both its speed and height remain constant.

299. Which of the following is NOT listed as a hazard associated with tropical cyclones?
(A) A rise in sea level known as a storm surge
(B) Vertical displacement of the seafloor
(C) High-velocity winds
(D) Torrential rainfall

300. The formation of a tropical cyclone requires a specific oceanic condition. What is this condition?
(A) Warm sea surface temperatures above 26.5°C
(B) Cold ocean currents from polar regions
(C) The presence of a deep ocean trench
(D) A shallow continental shelf

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Based on the above source, attempt the following five questions.

261. What is identified as the primary factor controlling the horizontal distribution of ocean temperature?
(A) The direction of prevailing winds
(B) The salinity of the water
(C) The depth of the ocean floor
(D) The latitude and associated solar radiation

262. How do ocean currents like the Gulf Stream influence regional climates?
(A) By causing upwelling of cold, nutrient-rich water
(B) By transferring heat from lower latitudes to higher latitudes
(C) By transporting cold water from polar regions to the tropics
(D) By increasing the salinity of coastal waters

263. The passage suggests that the oceans in the Northern Hemisphere receive more heat than those in the Southern Hemisphere due to which factor?
(A) A stronger Coriolis effect
(B) The presence of more warm currents
(C) A greater contact with extensive landmasses
(D) Lower average salinity levels

264. The upwelling of cold water from deeper layers is mentioned as a consequence of what phenomenon?
(A) The gravitational pull of the moon
(B) The convergence of two warm currents
(C) High levels of evaporation in tropical regions
(D) Winds blowing from the land towards the ocean

265. Based on the passage, the actual distribution of sea surface temperature is best described as:
(A) A complex pattern resulting from multiple interacting factors.
(B) A simple and direct function of latitude alone.
(C) A uniform temperature across all oceans.
(D) A pattern determined solely by the depth of the water.

Direction : Please read the following source carefully.

The vertical distribution of temperature in the oceans reveals a distinct layered structure, particularly in low and middle latitudes. This thermal stratification can be broadly divided into three zones. The first is the upper layer, or epipelagic zone, which extends from the surface to about 200 meters. This layer is characterized by relatively uniform, warm temperatures due to the mixing action of winds and waves and the direct penetration of solar radiation. Its thickness and temperature are subject to seasonal variations. Below this layer lies the thermocline, a transitional zone where temperature decreases rapidly with increasing depth. This zone acts as a boundary between the warm surface water and the cold, deep water below. The steep temperature gradient within the thermocline creates a density barrier that inhibits vertical mixing between the layers. The thermocline is a permanent feature in tropical oceans but may be present only seasonally in mid-latitudes. The third and largest zone is the deep water layer, extending from the bottom of the thermocline to the ocean floor. This layer is characterized by uniformly cold temperatures, typically just a few degrees above freezing, as it is insulated from solar radiation and composed of dense water that has sunk in the polar regions.

Based on the above source, attempt the following five questions.

266. Which layer of the ocean is characterized by a rapid decrease in temperature with increasing depth?
(A) The deep water layer
(B) The thermocline
(C) The epipelagic zone
(D) The abyssal zone

267. What is the primary function of the thermocline in the ocean's vertical structure?
(A) To facilitate the mixing of surface and deep waters
(B) To act as a density barrier inhibiting vertical mixing
(C) To absorb the majority of incoming solar radiation
(D) To support the highest concentration of marine life

268. The temperature in the deep water layer is uniformly cold primarily because:

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total mass within a specific volume, thereby raising the density. Consequently, higher salinity leads to heavier water that tends to sink below fresher layers. This relationship is a primary driver of thermohaline circulation. The added mass of dissolved solids directly correlates with the increase in seawater density.

9. (C) Thermocline
Vertical stratification in the ocean includes specific layers defined by rapid changes in physical properties. The thermocline is the transition layer between the warm surface waters and the cold deep ocean. Within this zone, temperature decreases sharply as depth increases. This layer acts as a significant barrier to vertical mixing and nutrient transport. Its depth and intensity vary seasonally and geographically, being most pronounced in tropical and temperate regions.

10. (A) Warm tropical oceans.
Tropical cyclones are intense low-pressure systems that require specific environmental conditions to develop and intensify. They exclusively originate over warm tropical ocean waters where surface temperatures typically exceed twenty-six degrees Celsius. This heat provides the necessary energy through the evaporation of moisture and subsequent release of latent heat during condensation. These storms do not form over land or cold polar waters because they lack this essential thermal energy.

11. (D) Guyot
Volcanic activity on the ocean floor creates various submerged peaks known as seamounts. When these underwater mountains have their tops flattened by the erosive action of waves and subsequently subside, they are specifically referred to as guyots. These flat-topped features are typically found in deep ocean basins. They provide evidence of ancient volcanic activity and subsequent sea-level changes or crustal subsidence over long geological periods of time.

12. (A) 1, 2 and 4 only
The continental shelf is the shallowest ocean region, while the continental slope represents the steep edge of the continent. Mid-oceanic ridges are active sites where tectonic plates diverge and new seafloor is created. Conversely, abyssal plains are remarkably flat and featureless, rather than rugged or mountainous. Most of the ocean floor is composed of these vast plains, which result from the slow accumulation of fine sediments over basaltic crust.

13. (C) Current
Ocean currents are continuous and predictable movements of seawater that flow in specific directions across the globe. These movements are primarily driven by wind patterns, Earth's rotation, and differences in water density caused by temperature and salinity variations. Unlike tides which rise and fall, or waves which mostly transfer energy, currents transport large volumes of water over vast distances. They play a critical role in regulating Earth's climate.

14. (D) Heat
The circulation of ocean water, occurring both horizontally and vertically, acts as a global conveyor belt for energy. Warm surface currents transport solar energy from tropical regions toward the colder poles, while deep-water currents return cooler water toward the equator. This continuous movement is essential for redistributing heat across the planet's surface. Without this oceanic transport, temperature extremes between the equator and the polar regions would be much more severe.

15. (A) 3, 1, 4, 2
Moving from the coastline toward the deep ocean, the seafloor exhibits a distinct sequence of relief features. The progression begins with the shallow continental shelf, followed by the steep continental slope. At the base of the slope lies the continental rise, which is formed by the accumulation of sediment. Finally, the rise transitions into the vast and flat abyssal plain, which constitutes the deepest and largest portion of the ocean floor.

16. (B) Presence of strong vertical wind shear.
The formation of tropical cyclones requires a set of specific atmospheric and oceanic conditions. These include warm sea surface temperatures, sufficient Coriolis force, and a pre-existing low-level disturbance. However, strong vertical wind shear is detrimental to cyclone development as it disrupts the storm's organized structure and prevents the concentration of latent heat. Low vertical wind shear is actually necessary for a

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63. (C) Neap Tides
Neap tides occur twice a month during the first and third quarter moon phases when the Sun and Moon are positioned at right angles to each other relative to the Earth. In this configuration, the gravitational pull of the Sun partially cancels out the gravitational pull of the Moon. This results in the smallest tidal range of the lunar month, characterized by high tides that are lower than usual and low tides that are higher than usual. This contrast with spring tides.

64. (D) Willy-willy - Mediterranean Sea
Tropical cyclones are given various regional names depending on where they occur. They are called cyclones in the Indian Ocean, hurricanes in the Atlantic and Caribbean, and typhoons in the Western Pacific. The term "willy-willy" was historically used to describe these storms in northwestern Australia. However, it is not associated with the Mediterranean Sea. The Mediterranean occasionally experiences similar storm systems, sometimes referred to as "medicanes," but the regional mapping of willy-willy to the Mediterranean is factually incorrect.

65. (A) Eustatic sea level rise
Thermal expansion is a process where the volume of water increases as its temperature rises. As the global climate warms, the upper layers of the ocean absorb heat, causing the water molecules to move more vigorously and take up more space. This expansion leads to a worldwide, uniform rise in sea level, which is a classic example of eustatic change. Thermal expansion is currently one of the primary drivers of observed global sea-level rise, alongside the melting of land-based ice.

66. (A) 1 and 3 only
Ocean density is primarily determined by temperature and salinity. Colder water is denser than warmer water, and saltier water is denser than fresher water. These density differences are the fundamental drivers of deep-water thermohaline circulation, as denser water sinks and flows along the seafloor. Density is not uniform throughout the ocean; instead, it is highly stratified with distinct layers. Therefore, only the statements regarding the effects of temperature and the role of density in circulation are scientifically accurate and correct.

67. (C) Drawback
Drawback is a dramatic coastal phenomenon that often occurs just before a tsunami arrives. As the leading edge of a tsunami wave approaches the shore as a trough, the sea level appears to recede significantly, exposing parts of the seafloor that are normally submerged. This sudden withdrawal of water happens because the massive wave is drawing water toward itself to build its height. Recognizing drawback is a critical natural warning sign that a massive tsunami wave will soon strike the coast.

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68. (D) Continental rise
The continental rise is a major relief feature located at the base of the continental slope. It consists of a thick accumulation of sediment that has moved down from the shelf and slope, creating a more gentle gradient before reaching the flat abyssal plain. This feature marks the final part of the continental margin. The sediments are often deposited by turbidity currents or underwater landslides, forming large submarine fans that gradually merge into the deep and vast floors of the ocean basins.

69. (C) The mid-latitudes experience significant seasonal variations in solar insolation.
The annual range of sea surface temperature varies by latitude due to the changing angle and duration of sunlight. Tropical regions receive relatively consistent solar energy throughout the year, resulting in a low temperature range. In contrast, the mid-latitudes experience distinct seasons with significant variations in solar insolation between summer and winter. These seasonal fluctuations cause the surface waters to warm and cool considerably over the course of the year, leading to a much larger annual temperature range in these regions.

70. (B) Subtropical gyre
A subtropical gyre is a large system of circulating ocean currents centered around a high-pressure region. In the North Atlantic, this gyre is composed of the Gulf Stream, the North Atlantic Drift, the Canary Current, and the North Equatorial Current. These currents form a continuous, clockwise loop that transports heat from the tropics to the higher latitudes and returns cooler water southward. This circular movement is driven by prevailing winds and the

terrestrial runoff are the primary factors that directly dictate the salinity levels.

25. (C) Continental shelf
The continental shelf is the initial submerged portion of the continental margin that descends gently from the coastline. It forms a relatively flat and shallow platform extending into the sea before reaching the steeper continental slope. This region is essentially a continuation of the landmass under ocean water. Due to its shallow depth, it receives ample sunlight, making it one of the most biologically productive and economically important zones within the global marine environment.

26. (A) Labrador Current - Cold Current
Ocean currents are classified based on their temperature relative to the surrounding environment. The Labrador Current is a cold current that flows southward from the Arctic Ocean along the eastern coast of Canada. In contrast, the Gulf Stream and Agulhas Current are major warm currents that transport tropical heat toward higher latitudes. The Benguela Current is a cold current flowing along the southwestern coast of Africa. Understanding these classifications is essential for studying regional climate patterns.

27. (D) Salinity with depth
The vertical structure of the ocean is defined by layers where specific properties change rapidly. The halocline is a distinct zone where salinity levels fluctuate significantly with increasing depth. This layer often acts as a density barrier, separating fresher surface water from the saltier, denser water below. Haloclines are particularly common in regions with high freshwater input, such as estuaries or areas with significant melting ice, influencing both local marine life and water circulation.

28. (B) Sodium Chloride
Seawater contains a variety of dissolved mineral salts, which contribute to its overall salinity. The most prevalent of these is sodium chloride, commonly known as table salt, which accounts for the vast majority of the total dissolved solids. Other significant salts include magnesium chloride, magnesium sulfate, and calcium sulfate. The consistent dominance of sodium chloride is a fundamental characteristic of ocean chemistry across the globe, providing the distinct salty taste and chemical properties of marine environments.

29. (C) The tidal range is the vertical distance between a high tide and the subsequent low tide. Tides represent the rhythmic fluctuations of sea level caused by gravitational forces. The tidal range is defined specifically as the vertical difference in height between the peak high tide and the following low tide. This range varies significantly depending on the alignment of the Sun and Moon, as well as local coastal geography. While diurnal tides have only one cycle per day, and spring tides require specific celestial alignment, the definition of tidal range remains constant.

30. (A) Strong onshore winds and low atmospheric pressure.
A storm surge is a rapid and dangerous rise in sea level occurring as a cyclone approaches the coast. This phenomenon is primarily driven by the intense onshore winds of the storm pushing water toward the land. Additionally, the extremely low atmospheric pressure at the center of the cyclone allows the ocean surface to rise slightly. When these factors combine, they can cause catastrophic flooding in coastal areas, especially when the surge coincides with a high tide.

31. (D) Wind
Most surface ocean currents are primarily generated and sustained by the friction of prevailing winds blowing across the sea surface. As wind moves over the water, it transfers energy, setting the top layers of the ocean in motion. While the Coriolis effect deflects these currents and density differences drive deep circulation, wind remains the fundamental force for the broad horizontal patterns observed at the surface. These wind-driven currents are essential for redistributing heat and moisture globally.

32. (B) Pacific Ocean
Oceanic trenches are the deepest parts of the seafloor, typically formed at subduction zones where one tectonic plate is forced beneath another. The Pacific Ocean contains the highest concentration of these features because it is surrounded by active convergent plate

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cyclone to intensify and maintain its powerful circular wind pattern.

17. (B) Wave energy moves forward while particles move in circular orbits.
In the open ocean, waves represent the transfer of energy across the water surface rather than the physical transport of water itself. As a wave passes, individual water particles move in nearly circular orbital paths, returning to their original positions after the cycle completes. While the wave form and its energy move forward across the sea, the water molecules remain localized. This orbital motion gradually decreases with depth until it eventually disappears completely.

18. (A) P-3, Q-1, R-2, S-2
Major ocean currents are distributed across different ocean basins and influenced by regional wind patterns. The Gulf Stream is a warm current in the North Atlantic. The Agulhas Current is a prominent warm current in the Indian Ocean. Both the Kuroshio and Peru currents are located within the Pacific Ocean, though they flow on opposite sides. The Kuroshio is warm and flows northward, while the Peru Current is cold and flows southward.

19. (C) The Sun, Earth, and Moon are aligned in a straight line.
Spring tides are characterized by the highest high tides and the lowest low tides of the lunar month. This occurs when the gravitational forces of the Sun and the Moon reinforce each other. Such alignment happens twice every month during the full moon and new moon phases. When these celestial bodies are in a straight line, the combined gravitational pull creates the maximum tidal bulge, resulting in a significantly larger tidal range.

20. (D) Eustatic change
Global sea-level fluctuations that affect the world's oceans simultaneously are described as eustatic changes. These are primarily caused by alterations in the total volume of water in ocean basins. The melting or accumulation of continental ice sheets is a major driver of this process. When glaciers melt, they add massive volumes of water to the oceans, causing a worldwide rise in sea levels. This differs from isostatic changes, which are local crustal adjustments.

21. (C) A is true but R is false.
West coasts of continents in mid-latitudes are typically bordered by cold currents moving from polar regions toward the equator. While these cold currents exist, the reasoning involving prevailing winds blowing away from western margins is incorrect for this specific geographic context. In the mid-latitudes, the prevailing westerlies actually blow from the ocean toward the land. Cold currents in these areas are often the result of large-scale gyre circulation and coastal upwelling processes.

22. (B) Water depth
The speed of a tsunami is fundamentally determined by the depth of the ocean through which it travels. In deep, open waters, these waves can move at speeds exceeding eight hundred kilometers per hour. However, as the wave enters shallower coastal waters, the friction with the seafloor increases, causing the wave to slow down significantly. This reduction in speed leads to a decrease in wavelength and a dramatic increase in the wave's vertical height.

23. (D) Calm weather and light winds.
The center of a mature tropical cyclone is a unique region known as the eye. This circular area is characterized by relatively calm conditions, clear skies, and light winds, contrasting sharply with the violent weather surrounding it. Within the eye, air gently descends from higher altitudes, suppressing cloud formation and precipitation. This calm zone is surrounded by the eyewall, which contains the most destructive winds and heaviest rainfall found within the entire storm system.

24. (A) 1, 2 and 3 only
Salinity is influenced by processes that add or remove freshwater from the ocean. Evaporation increases salinity by removing water and leaving salts behind. Conversely, precipitation and river runoff decrease salinity by adding freshwater to the sea. While wind and gravity influence water movement and tides, they do not directly change the chemical concentration of dissolved salts. Therefore, only evaporation, precipitation, and

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long wavelength is a result of the seismic energy displacing the entire water column. While it is true that tsunami speed is determined by water depth, this relationship explains why they slow down near coasts rather than why they possess long wavelengths. Both statements are factually correct, but the physical reason for long wavelengths is the nature of the initial displacement.

41. (C) Wavelength
Wavelength is the horizontal distance measured between two successive identical points of a wave, such as from crest to crest or trough to trough. This property is a fundamental characteristic of wave motion and determines how the wave interacts with the seafloor as it enters shallow water. Wind-driven waves typically have wavelengths of a few hundred meters, whereas tsunamis can have wavelengths of hundreds of kilometers. Wavelength is inversely related to wave frequency and influences the speed of propagation.

42. (A) The divergence of surface currents, particularly along coastlines.
Upwelling is an oceanographic process where deep, cold, and nutrient-rich waters are brought to the surface. This phenomenon typically occurs where surface currents diverge or where winds blow parallel to a coastline, pushing surface water away due to the Coriolis effect. As the surface water moves away, it is replaced by water from below. These regions are among the most biologically productive areas in the world's oceans, supporting massive marine ecosystems and highly productive commercial fishing industries.

43. (B) 1, 2, 3 and 5
Tropical cyclones are powerful storms known by different regional names, such as hurricanes or typhoons. They derive their immense energy from the latent heat released during the condensation of moisture. These systems require the Coriolis force to initiate their characteristic rotation and therefore do not form at the equator. Upon moving over land, they weaken rapidly as they lose their primary energy source. The central calm region is called the eye, not the eyewall, making that statement incorrect.

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44. (B) A very steep feature that marks the boundary between continental and oceanic crust.
The continental slope is a major relief feature that represents the steep descent from the outer edge of the continental shelf to the deep ocean floor. This feature is significant because it marks the true geological transition between the thicker continental crust and the thinner oceanic crust. Submarine canyons often score these slopes, which are characterized by much steeper gradients than the adjacent shelf or rise. It is a critical zone for sediment transport to the deep sea.

45. (C) 4°C
Pure water exhibits an unusual physical property where its maximum density occurs at approximately four degrees Celsius, rather than at its freezing point. As water cools toward this temperature, it contracts and becomes denser. However, as it cools further toward zero degrees, it begins to expand, becoming less dense until it freezes into ice. This unique characteristic is vital for aquatic life, as it causes the densest water to settle at the bottom of lakes, preventing them from freezing completely.

46. (D) Large riverine freshwater influx and limited open ocean connection.
The Baltic Sea is characterized by exceptionally low salinity levels compared to the open ocean. This is primarily due to the massive influx of freshwater from numerous large rivers that drain into the basin. Additionally, the sea has a very restricted connection to the salty waters of the North Sea through narrow straits. The combination of high freshwater input and limited mixing with the open ocean results in a brackish environment where salinity remains significantly below global averages.

47. (A) Gyres
Large-scale circular loops of ocean currents that dominate the major ocean basins are known as gyres. These systems are formed by the interaction of prevailing surface winds, the Coriolis effect, and the boundaries of the continents. There are five major subtropical gyres located in the North and South Atlantic, the North and South Pacific, and the Indian Ocean. These gyres are essential for the global transport of heat, nutrients, and

support rich marine life and highly productive commercial fisheries. Furthermore, many continental shelves contain vast deposits of oil and natural gas within their thick sedimentary layers. These areas are much more accessible for extraction than the deep ocean floor. Consequently, the shelf regions are the primary sites for offshore energy production and provide a significant portion of the global catch for the international fishing industry and seafood markets.

79. (C) Diurnal tide
A diurnal tide is a specific tidal pattern characterized by one high tide and one low tide during each lunar day, which is approximately twenty-four hours and fifty minutes long. This pattern is common in certain regions, such as parts of the Gulf of Mexico and the coast of Southeast Asia. Diurnal tides occur due to the complex interaction of the Earth's rotation, the Moon's declination, and the specific shape and depth of the ocean basin in those localized coastal areas.

80. (D) Seismic activity on the ocean floor
Effective tsunami warning systems primarily depend on the rapid detection of powerful underwater earthquakes, which are the most common cause of these massive waves. When a large earthquake occurs on the ocean floor, seismic sensors record the event and alert monitoring centers. Scientists then analyze the location and magnitude to determine if a tsunami has likely been generated. This seismic data, combined with real-time sea-level measurements from deep-ocean buoys, allows for timely warnings to be issued to vulnerable coastal communities.

81. (C) 4000 meters
Abyssal plains are vast, flat areas of the deep ocean floor found at the base of the continental rise. They generally lie at depths ranging between three thousand and six thousand meters, with the global average depth being approximately four thousand meters. These plains cover more than fifty percent of the Earth's surface. They are composed of thick layers of fine sediment that have accumulated over millions of years, burying the rugged volcanic crust and creating the planet's flattest and most extensive regions.

82. (B) A decrease in temperature and an increase in salinity.
The density of seawater is determined by its temperature and its salt content. Cold water is denser than warm water because molecules are more tightly packed at lower temperatures. Similarly, saltier water is denser than fresher water because the dissolved minerals add extra mass to the same volume of liquid. Therefore, a combination of cooling and increasing salinity is the most effective way to increase the density of seawater, often causing it to sink and drive deep-ocean circulation.

83. (A) 2, 3, 1, 4
The life cycle of a tsunami follows a distinct chronological sequence. It begins with the generation of the wave, most often by a sudden vertical displacement of the seafloor during a submarine earthquake. Next, the tsunami propagates across the open ocean at very high speeds with low wave heights. As it approaches shallow coastal waters, it slows down and its height increases dramatically. Finally, the massive wave moves onto the land, causing the inundation and flooding of vulnerable coastal areas.

84. (A) North Atlantic Ocean
The Sargasso Sea is a unique region of the North Atlantic Ocean characterized by calm blue waters and vast mats of floating sargassum seaweed. It is the only sea in the world that is defined by ocean currents rather than land boundaries. It is located within the North Atlantic Subtropical Gyre, bounded by the Gulf Stream, the North Atlantic Drift, the Canary Current, and the North Equatorial Current. The circular motion of these currents traps the seaweed and maintains the sea's distinct environment.

85. (C) The continental shelf has a very steep gradient, typically more than 10 degrees.
The continental shelf is characterized by a very gentle slope, usually averaging less than one degree, rather than a steep gradient. It is the submerged extension of the continent. In contrast, the continental slope is the feature with the much steeper descent toward the deep ocean. Other statements regarding the mid-oceanic ridges being the longest mountain chains, trenches being the deepest parts, and guyots being

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imperceptible to ships. This occurs because the wave's massive energy is distributed throughout the entire depth of the water column. Since the ocean is several kilometers deep in these areas, the resulting surface displacement is minimal. Both statements accurately describe the physical behavior of tsunamis and correctly identify the relationship between energy distribution and wave height in deep water.

56. (B) Wave period
The wave period is a specific measurement of time required for two consecutive wave crests to pass a fixed, stationary point. This property is fundamental to wave mechanics and is related to the wave's speed and wavelength. Shorter periods are typical of choppy, wind-driven seas, while longer periods characterize swells that have traveled great distances. Monitoring the wave period is essential for understanding how waves will behave as they approach the shoreline and interact with coastal structures or the seafloor.

57. (C) Isostatic rebound
Isostatic rebound is the process by which a landmass rises after the removal of a massive weight, such as an ice sheet. During glacial periods, the immense weight of the ice depresses the Earth's crust into the underlying mantle. When the ice melts, the crust slowly returns to its original equilibrium position. This vertical movement is a localized adjustment rather than a global change in sea level. It continues for thousands of years after the ice has completely disappeared.

58. (A) P-3, Q-4, R-1, S-2
Natural hazards in the marine environment are driven by different physical processes. Tsunamis are primarily generated by submarine earthquakes that displace the water column. Tropical cyclones derive their energy from the latent heat of moisture over warm ocean waters. Spring tides occur due to the linear alignment of the Sun, Moon, and Earth, which maximizes gravitational pull. Storm surges are the result of the extreme low pressure and intense winds associated with a passing cyclone pushing water onto land.

59. (D) Deflecting paths right in the North and left in the South.
The Coriolis effect is an apparent force caused by the Earth's rotation that influences the direction of moving objects, including ocean currents. In the Northern Hemisphere, this force deflects currents to the right of their path of motion. In the Southern Hemisphere, the deflection is to the left. This effect is crucial for the formation of large-scale circular ocean gyres. The strength of the Coriolis deflection is zero at the equator and reaches its maximum at the poles.

60. (A) Sea surface temperature of 20°C or less.
The development of a tropical cyclone requires very warm ocean water to provide the necessary energy through evaporation. Generally, a sea surface temperature of at least twenty-six and a half degrees Celsius is needed. Cold water below twenty degrees is incapable of sustaining the intense convection required for these storms. Other necessary conditions include being away from the equator for Coriolis force, having a pre-existing disturbance, and experiencing low vertical wind shear to maintain the storm's organized structure.

61. (C) Total solid material in grams contained in one kilogram of seawater.
Salinity is a fundamental property of seawater defined as the total mass of dissolved inorganic solids contained in a specific mass of water. It is traditionally expressed as the number of grams of salt present in one kilogram of seawater, often noted as parts per thousand. This measure accounts for all dissolved minerals, primarily sodium and chloride ions. Salinity influences the density, freezing point, and electrical conductivity of ocean water, and it varies globally due to evaporation and freshwater input.

62. (B) Continental shelf and slope
Submarine canyons are prominent geological features characterized by steep-sided, V-shaped valleys carved into the continental margin. These canyons typically begin on the outer continental shelf and extend deeply down the continental slope toward the ocean floor. They are primarily formed by turbidity currents, which are fast-moving, sediment-laden underwater flows, or by ancient river erosion during periods of lower sea levels. These canyons serve as major conduits for transporting sediments and nutrients from shallow coastal areas to the deep ocean.

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boundaries, often called the Ring of Fire. This ocean basin hosts the deepest known point on Earth, the Mariana Trench. In contrast, other ocean basins like the Atlantic or Indian have significantly fewer and generally shallower trenches.

33. (C) 1, 2 and 4
Salinity levels in the ocean are determined by the balance of processes that add or remove freshwater. High evaporation rates remove water, leaving salts behind and increasing salinity. Similarly, the freezing of sea ice excludes salt, making the remaining water saltier. River runoff adds freshwater, which serves to decrease salinity. Conversely, the melting of ice actually adds freshwater back into the system, which decreases salinity rather than increasing it, making that particular statement scientifically incorrect.

34. (B) Wave height
Wave height is the specific measurement of the vertical distance between the highest part of a wave, known as the crest, and the lowest part, known as the trough. This dimension provides a direct indication of the energy contained within the wave. Factors such as wind speed, duration, and fetch influence how high a wave can grow. Larger wave heights are associated with more powerful sea conditions and can have significant impacts on coastal erosion and navigation.

35. (C) The rise and fall of the land itself.
Isostatic sea-level changes are caused by the vertical movement of the Earth's crust rather than a change in the total volume of ocean water. This process occurs as the land surface rises or sinks in response to the addition or removal of heavy loads, such as massive ice sheets or thick sediment deposits. Unlike eustatic changes, which are global, isostatic adjustments are localized or regional. They reflect the crust's attempt to reach gravitational equilibrium within the underlying mantle.

36. (A) P-3, Q-4, R-1, S-2
Oceanographic and atmospheric terms are used to describe specific zones or lines of measurement. The thermocline represents a zone of rapid temperature change, while the pycnocline indicates a rapid change in density. The halocline is defined by a significant change in salinity with depth. In meteorology, an isobar is a line on a map that connects points of equal atmospheric pressure. Understanding these distinct classifications is essential for analyzing the physical properties of the marine and atmospheric environments.

37. (C) The Sun and Moon are at a right angle to each other with respect to the Earth.
Neap tides occur when the gravitational pull of the Sun and the Moon counteract each other. This specific celestial configuration happens when the Moon is in its first or third quarter phases, placing it at a right angle to the Sun relative to the Earth. During these times, the combined gravitational attraction is minimized, resulting in high tides that are lower than average and low tides that are higher than average, thus creating a minimal tidal range.

38. (B) Temperature and salinity (density)
The deep-water circulation of the world's oceans is primarily governed by differences in water density, a process known as thermohaline circulation. Density is determined by two main factors: temperature and salinity. Cold, salty water is denser and tends to sink in polar regions, flowing along the ocean floor toward the equator. This movement creates a global conveyor belt that slowly moves massive volumes of water, playing a critical role in long-term climate regulation and nutrient distribution.

39. (D) Coral Reef
Major ocean relief features are large-scale geological structures that define the shape of the ocean basins. These include the continental shelf, the steep continental slope, the vast abyssal plains, and the continuous mid-oceanic ridges. While coral reefs are significant biological and topographical features of the marine environment, they are considered minor or secondary features. Unlike the primary relief zones, reefs are formed by the biological accumulation of calcium carbonate rather than large-scale tectonic or erosional processes.

40. (B) Both A and R are true but R is not the correct explanation of A.
Tsunamis are unique waves characterized by extremely long wavelengths, often spanning hundreds of kilometers in the open ocean. This

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Coriolis effect, playing a major role in global heat redistribution.

71. (A) Both A and R are true and R is the correct explanation of A.
The Red Sea is known for having some of the highest salinity levels among the world's large water bodies. This is a direct consequence of its geographic location in an extremely hot and arid climate, which promotes very high rates of surface evaporation. Furthermore, the sea is nearly enclosed, with only limited exchange with the open ocean and almost no significant freshwater input from rivers. These factors combine to concentrate dissolved salts, making the water exceptionally salty and providing a clear explanation for the observed salinity.

72. (D) Isohalines
In oceanography, maps are often used to visualize the distribution of various water properties across the globe. Lines that connect points on a map where the ocean salinity is the same are specifically called isohalines. These lines help researchers identify patterns of freshwater input, evaporation, and the movement of different water masses. Similar to how isotherms show temperature or isobars show pressure, isohalines provide a clear visual representation of how salt concentration varies throughout different regions of the world's oceans.

73. (C) Circular
As a wave moves through deep water, the actual water molecules do not travel along with the wave form. Instead, each particle moves in a nearly perfect circular orbital path. When the wave crest passes, the particle moves forward and upward; as the trough follows, it moves backward and downward. This circular motion returns the particle to its approximate starting position after the wave passes. This orbital movement rapidly decreases with depth and is only significant in the upper layers of the ocean.

74. (C) 1, 3, and 5
Cold ocean currents are those that transport cooler water from polar or subpolar regions toward the lower, warmer latitudes. Examples include the Labrador Current in the North Atlantic, the Benguela Current along the southwestern coast of Africa, and the California Current along the western coast of North America. In contrast, currents like the Gulf Stream and the Agulhas Current are warm currents that move tropical waters toward the poles. Identifying these currents is essential for understanding regional climate influences and marine productivity.

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75. (D) A tide
A tide is defined as the periodic and rhythmic rise and fall of the ocean's surface level. This phenomenon occurs daily or twice-daily at most coastal locations and is primarily caused by the gravitational forces exerted by the Moon and the Sun on the Earth's oceans. As the Earth rotates and the Moon orbits, different parts of the planet experience the resulting tidal bulges. Tides are distinct from wind-driven waves or currents, representing a large-scale, predictable movement of the entire ocean mass.

76. (B) The eyewall
The eyewall is the most violent part of a mature tropical cyclone, located immediately surrounding the calm central eye. It consists of a ring of towering thunderstorms where the storm's most intense convection occurs. This region contains the highest wind speeds and the most torrential rainfall found within the entire system. Because the eyewall carries the maximum destructive energy of the storm, its passage over a coastal area typically causes the greatest amount of property damage and the most severe storm surge impacts.

77. (B) Global density gradients created by surface heat and freshwater fluxes.
Thermohaline circulation is the slow, deep-water movement of the world's oceans, often described as the global conveyor belt. This circulation is driven by differences in water density, which are controlled by temperature and salinity. In polar regions, water becomes very cold and salty, increasing its density and causing it to sink. This downward movement pulls in warmer surface water to replace it, creating a continuous global loop. This process is vital for distributing heat, dissolved gases, and nutrients throughout the deep ocean.

78. (A) Fisheries and petroleum reserves
The continental shelf is of immense economic importance because its shallow, sunlit waters

marine organisms, significantly influencing regional and global climates.

48. (B) An increase or decrease in the volume of water in the oceans.
A eustatic change refers to a global fluctuation in sea level that occurs uniformly across all the world's oceans. This type of change is primarily driven by alterations in the total volume of water within the ocean basins. The most common cause is the melting or growing of continental glaciers and ice sheets during climatic cycles. When ice melts, it adds water to the oceans, raising levels globally. This process is distinct from local changes caused by tectonic movements.

49. (B) The mixing of warm and cold currents creates poor fishing grounds.
Ocean currents have profound effects on coastal environments and marine life. Warm currents raise temperatures in high-latitude regions, while cold currents can lead to the formation of coastal deserts and frequent fog. Contrary to being poor areas, the convergence of warm and cold currents actually creates some of the world's most productive fishing grounds. The mixing of these waters promotes nutrient cycling and supports high concentrations of plankton, which form the base of rich and diverse marine food webs.

50. (A) Sustained wind speed
The Saffir-Simpson Hurricane Wind Scale is a classification system used to categorize tropical cyclones based on their maximum sustained wind speeds. The scale ranges from Category 1, representing the lowest intensity, to Category 5, which includes the most catastrophic storms. This measurement helps emergency responders and the public estimate the potential for property damage and flooding. While cyclones also produce heavy rain and storm surges, the scale itself is defined solely by the intensity of the sustained winds.

51. (A) 2, 1, 3, 4
Seawater contains a consistent ratio of various dissolved mineral salts. Sodium chloride is by far the most abundant, followed by magnesium chloride. Magnesium sulfate and calcium sulfate are also present but in significantly smaller quantities. This specific order of abundance is relatively constant throughout the global ocean, regardless of the total salinity level. Understanding the concentration of these salts is fundamental to marine chemistry and explains the distinct physical and chemical properties of the ocean's salt-water environment.

52. (D) Density
The pycnocline is a specific layer in the ocean where water density increases rapidly with increasing depth. This zone typically occurs below the surface mixed layer and above the deep ocean. The change in density is primarily caused by fluctuations in temperature or salinity within that depth range. The pycnocline acts as a significant physical barrier that limits the vertical mixing of water masses, thereby influencing the distribution of nutrients, dissolved gases, and various types of marine organisms.

53. (C) Extremely flat and featureless deep-ocean floors.
Abyssal plains are vast, remarkably flat regions found on the deep ocean floor, typically at depths between three thousand and six thousand meters. These plains are formed by the slow and continuous accumulation of fine-grained sediments, such as clay and silt, which eventually bury the underlying rugged volcanic topography of the oceanic crust. They are considered the flattest places on Earth. Abyssal plains cover more than half of the planet's surface and are essential components of deep-sea ecosystems.

54. (A) 1 and 2 only
Ocean currents are classified based on their direction of flow and temperature relative to the surrounding water. Warm currents typically flow from tropical regions toward higher latitudes, while cold currents move from polar or subpolar regions toward the equator. The Gulf Stream is actually a warm current, and the Peru Current is a cold current. While the Peru Current does influence arid conditions in Chile, the incorrect description of the Gulf Stream makes statements three and four scientifically inaccurate.

55. (A) Both A and R are true and R is the correct explanation of A.
In the deep, open ocean, tsunamis are characterized by very low wave heights, often less than one meter, making them virtually

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flat-topped seamounts are all factually correct descriptions of major oceanic relief features and their characteristics.

86. (A) P-3, Q-4, R-1, S-2
Tides are classified by their frequency and range. Spring tides occur when celestial alignment maximizes the tidal range, while neap tides happen when the Sun and Moon are at right angles, minimizing the range. Diurnal tides feature a single high and low tide each day. Semi-diurnal tides have two high and low tides of roughly equal height daily. Mixed tides involve two highs and lows of unequal height. Understanding these patterns is essential for coastal navigation, marine engineering, and environmental management.

87. (D) The Earth's rotation.
The Coriolis effect is an apparent force that causes the deflection of moving objects, such as winds and ocean currents, across the Earth's surface. This phenomenon is a direct consequence of the Earth's rotation on its axis. As the planet rotates, points at different latitudes move at different speeds, causing any fluid moving over the surface to curve relative to the ground. This deflection is vital for the creation of major ocean gyres and influences the path of large-scale atmospheric circulation.

88. (B) Thermal expansion of water and melting of terrestrial ice.
The current global rise in sea level is primarily driven by two related processes resulting from a warming climate. First, thermal expansion occurs as ocean water warms and increases in volume. Second, the melting of land-based ice, such as glaciers and the massive ice sheets in Greenland and Antarctica, adds significant volumes of freshwater into the oceans. While tectonic movements and sedimentation cause local changes, the combination of expansion and terrestrial ice melt is the dominant cause of worldwide sea-level rise today.

89. (C) Counter-clockwise and has a depressed sea surface.
In the Northern Hemisphere, ocean eddies are classified by their rotation and core temperature. A cold-core eddy consists of a rotating mass of cool water that spins in a counter-clockwise direction. Due to the Coriolis effect and the nature of the rotation, the water in the center of the eddy is pushed outward, causing the sea surface in the middle to be slightly depressed. These eddies are often associated with high nutrient levels and biological productivity as they draw deeper water toward the surface.

90. (A) Both A and R are true and R is the correct explanation of A.
Tropical cyclones require the Coriolis force to initiate the rotation that defines their circular structure. This force is a result of Earth's rotation and its strength depends on latitude. At the equator, the Coriolis force is zero, meaning that air tends to flow directly into low-pressure areas without curving. Without this rotational influence, organized cyclonic systems cannot form or maintain themselves. Therefore, cyclones are never observed within the immediate vicinity of the equator, usually only developing at least five degrees away.

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91. (D) The uninterrupted distance over which the wind blows.
Fetch is a critical factor in the generation of wind-driven ocean waves. It refers to the total horizontal distance of open water over which the wind blows in a constant direction without being obstructed by land. A larger fetch allows the wind to transfer more energy to the water surface, resulting in the development of higher and more powerful waves. Along with wind speed and duration, fetch determines whether the sea will remain relatively calm or become dangerously rough with large swells.

92. (A) Atlantic Ocean
The Atlantic Ocean basin is uniquely characterized by the Mid-Atlantic Ridge, a massive underwater mountain range that runs almost continuously from the Arctic toward the Southern Ocean. This ridge follows a central path between the continents, mirroring the shape of the coastlines on either side. It is a divergent plate boundary where new oceanic crust is being formed as tectonic plates pull apart. This central ridge is the most prominent topographic feature of the Atlantic floor, dividing the basin into distinct sections.

93. (C) 1, 2 and 3 only

of flow. The Benguela and Oyashio currents are cold currents that move cooler water toward lower latitudes. In contrast, the Brazil and Mozambique currents are warm currents that transport tropical water toward higher latitudes. Understanding the distribution and temperature of these currents is essential for studying regional climate patterns, marine life distribution, and the global redistribution of heat throughout the world's ocean basins.

154. (D) Its speed decreases, its wavelength decreases, and its height increases.
As a deep-water wave enters shallow coastal water, it undergoes significant physical changes due to friction with the seafloor. The bottom of the wave slows down, causing the overall wave speed to decrease. As the front of the wave slows, the following part of the wave catches up, leading to a decrease in wavelength. To conserve energy, the wave's vertical height must increase, eventually causing it to become unstable and break as it reaches the shore. This process is known as wave shoaling.

155. (A) Both A and R are true and R is the correct explanation of A.
Spring tides are characterized by the maximum tidal range of the lunar month, meaning they have the highest high tides and the lowest low tides. This phenomenon occurs twice every month, during the full moon and new moon phases. At these times, the Sun, Moon, and Earth are aligned in a straight line, and the gravitational pull of the Sun reinforces the gravitational pull of the Moon. Both statements accurately describe this event and correctly identify the cause-and-effect relationship between celestial alignment and tidal range.

156. (B) Mid-Atlantic Ridge
The Mid-Atlantic Ridge is a massive, continuous underwater mountain range that runs through the center of the Atlantic Ocean from north to south. It is the most prominent feature of the Atlantic floor and represents a divergent plate boundary where new oceanic crust is being formed. The ridge follows the curve of the surrounding continental coastlines. In contrast, the Mariana Trench is in the Pacific, and the East Pacific Rise is another ridge system. The ridge system is the longest mountain chain on Earth.

157. (D) The difference between evaporation and precipitation.
The global distribution of surface salinity is primarily controlled by the balance between the processes that remove freshwater and those that add it. Evaporation removes water molecules, leaving salts behind and increasing salinity. Precipitation, such as rain and snow, adds freshwater to the ocean, which dilutes the salt concentration and lowers salinity. Therefore, regions with high evaporation and low rainfall, like the subtropics, have the highest surface salinity, while regions with high rainfall, like the equator, exhibit lower surface salinity levels.

158. (A) 1 and 4 only
Cyclones are low-pressure systems characterized by a counter-clockwise rotation in the Northern Hemisphere and a clockwise rotation in the Southern Hemisphere. A storm surge is a rapid rise in sea level caused by a storm's winds and low pressure, which is independent of the tide. However, the central pressure in a cyclone is extremely low, not high. Furthermore, cyclones dissipate over land or cold water, but they intensify and are sustained over warm ocean water. Therefore, only the first and fourth statements are correct.

159. (C) Shelf break
The shelf break is the specific topographic feature that marks the outer edge of the continental shelf and the beginning of the continental slope. It is the point where the nearly flat shelf abruptly transitions to a much steeper descent toward the deep ocean floor. The shelf break typically occurs at a depth of around two hundred meters. This boundary is significant because it marks the transition between shallow coastal waters and the deep marine environment, influencing current patterns, sediment transport, and the distribution of marine organisms.

160. (B) Thermohaline circulation
The "Great Ocean Conveyor Belt" is a conceptual model used to describe the large-scale thermohaline circulation. This system involves the continuous movement of water through the deep ocean, driven by differences in density caused by temperature and salinity. Cold, dense water sinks in the North Atlantic and returns to the surface through upwelling in other parts of

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wave height is very low and its period is very long, making it safely unnoticeable to ships.

101. (A) 1, 2, and 3 only
Mid-oceanic ridges are sites of crustal divergence where plates pull apart, while trenches are associated with subduction zones where plates converge. The Coriolis effect is zero at the equator and reaches its maximum strength at the poles. Upwelling is beneficial as it brings nutrient-rich water to the surface, supporting marine life. Warm currents are typically found on the western sides of ocean basins in the tropics, not the eastern. Thus, only the statements regarding ridges, trenches, and the Coriolis effect are factually correct.

102. (B) Convection
Convection is the primary process for transferring heat through the movement of fluids like water. In the ocean, as water is heated by the sun at the surface or cooled in polar regions, its density changes, causing it to move. This movement creates circulation patterns that transport thermal energy from one region to another. Horizontal transport of heat by currents is also referred to as advection. Both vertical and horizontal water movements are essential components of the ocean's role in the global heat redistribution system.

103. (D) Depth
An isobath is a line drawn on a map or nautical chart that connects points of equal underwater depth. These lines are used to visualize the topography of the seafloor, similar to how contour lines represent elevation on land. Isobaths are essential for navigation, as they indicate the shape of the continental shelf, the location of slopes, and the presence of deep trenches or shallow shoals. They provide a clear representation of the three-dimensional structure of ocean basins in a two-dimensional format.

104. (A) They are associated with the formation of coastal deserts and fog.
Cold ocean currents significantly influence the climate of adjacent landmasses. As air passes over the cold water, it cools and becomes stable, which suppresses convection and inhibits rainfall. This often leads to the formation of arid coastal deserts, such as the Atacama or the Namib. Furthermore, the cooling of moist air over these currents frequently results in the development of dense coastal fog. These regions are also typically rich in nutrients due to upwelling, supporting abundant marine life and productive fishing areas.

105. (C) The large volume of water it moves.
The immense destructive power of a tsunami is derived from the fact that it involves the movement of the entire water column from the seafloor to the surface. Unlike wind-driven waves, which only affect the top layer, a tsunami carries a massive volume of water and enormous momentum. When this huge mass of water reaches the coast, it does not just break like a normal wave; instead, it arrives as a powerful, relentless surge that can flood vast inland areas and demolish structures.

106. (A) P-2, Q-4, R-3, S-1
Tropical cyclones are known by different regional names across the globe. They are called hurricanes in the Atlantic and Caribbean regions. In the West Pacific and China Sea, they are referred to as typhoons. In the Indian Ocean, the term cyclone is used. Historically, the term willy-willy was applied to these intense storms in northwestern Australia. Identifying these regional variations is important for understanding international meteorological reports and the geographic distribution of powerful storm systems throughout the world's tropical and subtropical ocean basins.

107. (D) The Thermohaline circulation
Thermohaline circulation is the slow, large-scale movement of water through the deep ocean, often called the global conveyor belt. This process is driven by density differences, which are created by variations in temperature and salinity. In polar regions, cold and salty water becomes very dense and sinks, flowing along the ocean floor for thousands of miles. This circulation is critical for the global transport of heat, nutrients, and dissolved carbon dioxide, playing a major role in regulating the Earth's long-term climate.

108. (B) Seamount
A seamount is a submerged mountain rising from the ocean floor, typically formed by volcanic activity. These features are usually found in

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deep ocean basins and can occur individually or in chains. They represent ancient or active volcanoes that have not reached the sea surface. Seamounts are biologically significant because they often host unique ecosystems and attract a wide variety of marine life. If a seamount has a flat top, usually due to wave erosion before submergence, it is specifically called a guyot.

109. (C) River runoff
Salinity is decreased by any process that adds freshwater to the ocean. River runoff is a major source of freshwater, especially near continental margins and estuaries, where it significantly dilutes the salt content of the surrounding sea. In contrast, processes like evaporation and the formation of sea ice increase salinity by removing water molecules or excluding salt. Upwelling brings deeper water to the surface, which is often saltier than surface layers. Therefore, river runoff is the primary factor listed that reduces ocean salinity.

110. (A) Both A and R are true and R is the correct explanation of A.
Coastal rainfall patterns are heavily influenced by the temperature of offshore ocean currents. Warm currents flow along the eastern coasts of continents in tropical and subtropical regions, warming the overlying air and increasing its moisture-holding capacity. This leads to high humidity and frequent rainfall. Conversely, cold currents flow along the western coasts, cooling the air and making it stable and dry, which inhibits rain. This explains why eastern coasts are generally wetter and western coasts often host deserts. Both statements correctly describe this climatic relationship.

111. (D) The leading edge of the incoming tide forms a wave (or waves) that travels up a river or narrow bay.
A tidal bore is a dramatic natural phenomenon that occurs in some rivers and narrow inlets. It happens when the leading edge of a powerful incoming tide is forced into a shallow, narrowing channel. This compresses the water, causing it to form one or more distinct waves that travel upstream against the river's current. Tidal bores can be several meters high and move with significant force. They are most common in areas with large tidal ranges and specific funnel-shaped coastal geography.

112. (A) A continuous supply of heat and moisture from a warm ocean surface.
The intensification of a tropical cyclone is fundamentally dependent on the energy provided by warm ocean waters. As warm, moist air rises from the surface, it releases latent heat during condensation, which fuels the storm's powerful winds and convection. A deep layer of warm water ensures that the storm has a consistent energy source. In contrast, landmasses or strong vertical wind shear disrupt the storm's structure and energy supply, causing it to weaken. Thus, a warm ocean surface is the most critical requirement.

113. (A) 2, 4, 1, 3
Ocean relief zones are characterized by distinct average depths. The continental shelf is the shallowest, typically reaching about two hundred meters. The continental slope follows, descending to depths of several thousand meters. Abyssal plains occupy the vast deep-ocean floor, with an average depth of around four thousand meters. Finally, oceanic trenches represent the deepest parts of the entire ocean, with some exceeding ten thousand meters. This sequence accurately reflects the general progression of depth as one moves from the coast to the deep sea.

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114. (D) The primary source of heat, the sun, only warms the surface layers.
The temperature of ocean water generally decreases with depth because solar radiation, the main source of heat, can only penetrate the upper few hundred meters. This creates a warm surface mixed layer. Below this, the thermocline marks a region of rapid temperature decline. In the deep ocean, where sunlight never reaches, the water remains consistently cold and near freezing. Since water is a poor conductor of heat and deep waters originate in polar regions, the vertical temperature profile remains highly stratified.

115. (A) Oscillation involves circular orbits; translation involves forward movement.
Waves of oscillation and waves of translation describe different behaviors of water particles during wave motion. In a wave of oscillation, typically found in deep water, the wave form

moves forward but the water particles themselves move in nearly circular orbits, returning to their original positions. A wave of translation occurs as waves enter shallow water and break. Here, the circular motion is disrupted, and the water particles physically move forward toward the shore, carrying both energy and mass in a horizontal direction.

116. (B) Mixing of the cold Labrador Current and the warm Gulf Stream.
The Grand Banks of Newfoundland are legendary for their abundant marine life and rich fisheries. This biological productivity is primarily due to the convergence of the cold, nutrient-rich Labrador Current and the warm, saline Gulf Stream. The mixing of these two distinct water masses creates an environment where nutrients are continuously cycled to the surface, supporting massive blooms of phytoplankton. This forms the base of a diverse food web that includes large populations of fish, making it a globally significant commercial fishing ground.

117. (B) Earthquakes
Tropical cyclones are associated with several severe meteorological and hydrological hazards. These include extremely strong winds that can destroy buildings, heavy rainfall leading to widespread inland flooding, and storm surges that cause catastrophic coastal inundation. While cyclones are powerful atmospheric events, they do not directly cause geophysical events like earthquakes. Earthquakes are driven by internal tectonic processes within the Earth's crust. Therefore, among the choices provided, earthquakes are the only hazard that is not a direct consequence of a tropical cyclone system.

118. (A) The thermohaline circulation
The global conveyor belt is a common term for the thermohaline circulation, which is the slow, deep-water movement connecting all the world's oceans. This circulation is driven by differences in density, which are determined by temperature and salinity. Cold, salty water sinks in the North Atlantic and near Antarctica, flowing through the deep basins before eventually upwelling in other regions. This massive system is essential for redistributing heat, nutrients, and dissolved gases around the planet, significantly influencing the global climate over long periods.

119. (C) Has a flat, eroded top.
Guyots and seamounts are both submerged volcanic mountains rising from the deep ocean floor. However, a guyot is specifically distinguished by having a remarkably flat top. This flatness is usually the result of the volcano once reaching the sea surface, where its peak was eroded by the constant action of waves. Over time, the volcano subsided or the sea level rose, leaving the eroded, flat-topped structure submerged in the deep ocean. Regular seamounts typically maintain their peaked, original volcanic shape.

120. (D) The Red Sea
Surface salinity is highest in regions where evaporation significantly exceeds precipitation and freshwater input. The Red Sea is a prime example, as it is located in an extremely hot, arid environment with no permanent river inflow. Furthermore, its narrow connection to the open ocean limits the mixing with fresher waters. This results in the concentration of salts and exceptionally high salinity levels. In contrast, areas like the Amazon estuary or the Baltic Sea have very low salinity due to massive freshwater input.

121. (B) 1, 2 and 3 only
Spring tides feature a greater range because the Sun and Moon are aligned, and their gravitational influence is stronger than the Sun's. Tides are also technically classified as very long, shallow-water waves. However, the term "spring tide" refers to the water "springing up" and occurs twice every month throughout the year, regardless of the season. Therefore, the statement claiming spring tides only happen during the spring season is a common misconception and is factually incorrect. The first three statements are correct.

122. (B) Local or regional in scale.
Sea-level changes are classified based on their extent and cause. Eustatic changes are global and uniform, resulting from a change in the total volume of water in the ocean basins, such as from melting ice sheets. In contrast, isostatic changes are localized or regional. They are caused by the vertical movement of the Earth's crust itself, often due to the loading or unloading of weight like glaciers or sediments. This crustal adjustment affects sea level only in the specific area experiencing the movement.

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Ocean currents are vital for global heat transport and influence coastal climates and fishing grounds. Warm and cold currents meeting often create fog, and cold currents contribute to arid conditions on western coasts. However, deep ocean currents are driven by density differences, not wind. Furthermore, ocean gyres rotate clockwise in the Northern Hemisphere and counter-clockwise in the Southern Hemisphere. Therefore, only the first three statements regarding heat transfer, fog formation, and aridity on western coasts are factually correct and scientifically accurate.

139. (D) Abundant plant life
The abyssal zone refers to the deep ocean, typically between four thousand and six thousand meters. It is characterized by extreme pressure, total darkness, and very cold temperatures. Because there is no sunlight, photosynthesis is impossible, meaning that there is no plant life in this zone. Instead, the ecosystem relies on "marine snow" falling from surface layers or chemical energy from hydrothermal vents. Therefore, the presence of abundant plant life is the only characteristic listed that is not found in the abyssal zone.

140. (C) Earth's rotation
The Coriolis force is an apparent force that deflects the path of objects moving over the Earth's surface. This phenomenon is a direct result of the Earth's rotation. As the planet spins, the ground at the equator moves faster than at the poles. This difference in rotational speed causes moving air and water to curve relative to the Earth's surface—to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This effect is crucial for determining global wind and current patterns.

141. (B) Trough
In the study of ocean waves, specific terms are used to describe the different parts of the wave form. The trough is the term for the lowest point of a wave between two successive crests. The crest is the highest point. The vertical distance between the crest and the trough is the wave height. Understanding these basic components is essential for describing wave characteristics and analyzing how waves transfer energy across the ocean surface and interact with coastal environments as they approach the shore.

142. (D) Tidal range
The tidal range is defined as the vertical difference in height between a high tide and the subsequent low tide. This range is not constant but varies depending on the phase of the moon, the time of year, and local coastal features. For example, the range is maximized during spring tides and minimized during neap tides. Some coastal areas, like the Bay of Fundy, are famous for having exceptionally large tidal ranges, while other regions may experience very little change in sea level.

143. (A) Tectonic uplift of a coastal region.
A local or isostatic sea-level change occurs when the land itself moves relative to the water surface. Tectonic uplift, where forces within the Earth's crust push a coastal region upward, would cause the local sea level to appear to fall. In contrast, the melting of ice sheets, thermal expansion of water, and global warming are all factors that contribute to a eustatic, or global, rise in sea level. Therefore, only the vertical movement of the landmass provides a mechanism for a localized sea-level fall.

144. (C) Increases the salinity of the surrounding seawater.
When sea ice forms in polar regions, the process involves the freezing of water molecules into a crystal lattice, which largely excludes the dissolved salts. These salts are concentrated into a cold, dense brine that is released into the surrounding ocean. Consequently, the formation of sea ice serves to increase the salinity and density of the nearby seawater. This cold, salty, and dense water then sinks, playing a vital role in driving the global thermohaline circulation or the ocean's deep-water conveyor belt.

145. (A) The highest wind speeds and most intense precipitation.
The eyewall is the most dangerous and destructive part of a tropical cyclone. It is a dense ring of towering thunderstorms that immediately surrounds the calm central eye. Within the eyewall, the storm's pressure gradient is steepest, resulting in the highest sustained wind speeds. Additionally, the intense convection in this region produces the most torrential rainfall. When the eyewall passes over a coastal area, it brings the

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shallower near the coast, the wave slows down. This relationship explains why tsunamis travel at jet-plane speeds in the deep ocean but slow down near shorelines.

131. (A) P-3, Q-4, R-1, S-2
Oceanographic and tectonic processes are linked to specific oceanic features. Thermohaline circulation involves the formation of deep water in polar regions. Surface wind-driven circulation creates large subtropical gyres. Seafloor spreading occurs at mid-oceanic ridges where new crust is created. Subduction happens at oceanic trenches where one tectonic plate is forced beneath another. Understanding these connections is essential for studying the physical and geological dynamics of the world's oceans and the processes that shape the deep sea floor.

132. (B) The storm surge.
While cyclones bring many hazards, the storm surge is typically the most significant cause of coastal flooding and loss of life. A storm surge is a rapid rise in sea level caused by the intense onshore winds of a cyclone pushing a massive volume of water toward the coast. The extremely low atmospheric pressure at the storm's center also allows the sea surface to rise. This wall of water can overwhelm coastal defenses, flood low-lying communities, and cause widespread destruction far inland.

133. (C) The cycle of glacial and interglacial periods.
Over geological timescales, the most significant natural cause of eustatic sea-level change is the cycling between glacial and interglacial periods. During ice ages, vast amounts of water are trapped on land as massive ice sheets, causing global sea levels to drop significantly. During warmer interglacial periods, such as the one we are in now, the melting of these ice sheets returns water to the oceans, causing sea levels to rise. This process alters the total volume of water in the ocean basins.

134. (D) Density decreases as temperature increases or salinity decreases.
The density of seawater is primarily controlled by its temperature and salinity. As water warms, its molecules move faster and take up more space, leading to a decrease in density. Similarly, if salinity decreases, such as from freshwater input, the mass of the water decreases for a given volume, also resulting in lower density. Therefore, the least dense water is typically warm and fresh, while the densest water is cold and salty. This relationship is fundamental to understanding ocean stratification and circulation patterns.

135. (A) Both A and R are true and R is the correct explanation of A.
The Pacific Ocean is surrounded by a region of intense tectonic and volcanic activity known as the Ring of Fire. This is a direct consequence of the basin being fringed by numerous convergent plate boundaries where oceanic crust is constantly being subducted beneath other plates. These subduction zones create the world's deepest trenches and trigger the formation of volcanic arcs and frequent, powerful earthquakes. Both statements correctly describe these features and accurately identify subduction as the primary geological process responsible for the high activity in the Pacific.

136. (B) The swash and backwash of waves approaching the shore at an angle.
Longshore drift is the process by which sand and other sediments are moved along a beach. This occurs when waves approach the shoreline at an angle. The incoming wave, or swash, pushes sand up the beach at that same angle. When the water recedes as backwash, it flows straight down the slope of the beach due to gravity. This repeated cycle creates a zigzag pattern of movement that slowly transports sediment along the coast, significantly shaping shorelines and affecting the development of beaches.

137. (B) Very high speed of propagation.
A key characteristic of a tsunami in the deep, open ocean is its incredibly high speed of propagation, which can exceed eight hundred kilometers per hour. Despite this high speed, the wave height is usually very low, often less than one meter, and the wavelength is extremely long, spanning hundreds of kilometers. This makes the tsunami virtually unnoticeable to ships at sea. It is only as the tsunami enters shallow coastal waters that it slows down and its height increases to dangerous levels.

138. (A) 1, 2, and 3 only

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123. (D) Aphotic
The ocean is divided into vertical zones based on the amount of sunlight that penetrates the water. The photic zone receives enough light for photosynthesis, while the dysphotic zone receives only dim light. The aphotic zone is the deepest layer, where no sunlight reaches at all, resulting in total darkness. This zone makes up the majority of the ocean's volume. Life in the aphotic zone must rely on energy from organic matter falling from above or from chemical energy found at hydrothermal vents.

124. (A) Pacific Ocean
The California Current and the Peru Current are both major cold currents found within the Pacific Ocean basin. The California Current flows southward along the western coast of North America, while the Peru Current, also known as the Humboldt Current, flows northward along the western coast of South America. Both currents transport cool water from higher latitudes toward the equator and are associated with coastal upwelling, making them highly productive regions for marine life and significant influences on the local arid climates.

125. (C) Tsunami
A sudden and dramatic recession of the sea from the coastline, often exposing areas of the seafloor that are normally submerged, is a classic warning sign of an approaching tsunami. This drawback occurs when the trough of the tsunami wave reaches the shore before the crest. The wave effectively pulls water away from the coast to build its massive height. This recession is usually followed within minutes by the arrival of the actual wave crest, which can cause catastrophic flooding and destruction.

126. (A) A cold front at its leading edge.
A mature tropical cyclone is a warm-core, low-pressure system that has a very organized structure. This includes a calm central eye, a violent eyewall, and spiral rainbands. Unlike mid-latitude storms, which are driven by temperature differences between air masses, tropical cyclones are powered by the latent heat of warm, moist air. Therefore, they do not contain weather fronts, such as cold fronts, as part of their internal structure. The absence of fronts is a key distinguishing feature of tropical cyclone systems.

127. (D) The divergence (spreading apart) of tectonic plates.
The Mid-Oceanic Ridge system is a continuous underwater mountain range formed at divergent plate boundaries. As tectonic plates pull apart, magma from the mantle rises to fill the gap, cooling and solidifying to create new oceanic crust. This process, known as seafloor spreading, pushes the existing crust away from the ridge. This volcanic activity and the buoyant nature of the new, warm crust create the elevated mountain system that stretches across all the world's major ocean basins.

128. (B) An enclosed lagoon in a hot, dry climate.
Local salinity is highest in environments where evaporation rates are high and freshwater input is minimal. An enclosed lagoon in a hot, dry climate is an ideal setting for salts to become highly concentrated as water is removed by evaporation without being replaced by rain or river runoff. In contrast, river mouths, melting icebergs, and areas with heavy rainfall all introduce freshwater into the sea, which significantly dilutes the salt concentration and lowers the local salinity levels of the surrounding ocean water.

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129. (C) Coriolis effect and wind patterns
The large-scale circular circulation patterns in the major ocean basins, known as gyres, are primarily driven by the interaction of prevailing winds and the Coriolis effect. Surface winds, such as the trades and westerlies, set the water in motion. The Coriolis effect, caused by the Earth's rotation, then deflects these moving waters to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This deflection, combined with the presence of continental boundaries, creates the characteristic clockwise and counter-clockwise gyre rotations.

130. (D) Water depth
A shallow-water wave is defined as a wave that is traveling in water with a depth less than one-twentieth of its wavelength. For waves like tides and tsunamis, which have very long wavelengths, the entire ocean is effectively shallow. In these cases, the speed of the wave is almost entirely determined by the water depth. As the water gets

most severe wind damage and the highest risk from storm surge and flooding.

146. (D) Continental slope
The continental slope is the major relief feature that marks the boundary between the shallow continental shelf and the deep ocean basin. It is characterized by a much steeper gradient than the shelf or the rise. Geologically, the continental slope represents the true edge of the continent, where the thick continental crust transitions into the thinner oceanic crust. Submarine canyons often score the slope, serving as channels for sediment to be transported from the coastal margins to the deep sea floor.

147. (B) Gulf Stream
The Gulf Stream is a powerful, warm, and fast-flowing western boundary current in the North Atlantic Ocean. It originates in the Gulf of Mexico, flows through the Straits of Florida, and then moves northward along the eastern coast of the United States. This current transports massive amounts of warm tropical water toward the higher latitudes of the North Atlantic. Its heat has a significant moderating effect on the climate of Western Europe, making winters there much milder than at similar latitudes elsewhere.

148. (C) Temperature and salinity
The density of seawater is primarily determined by two fundamental properties: its temperature and its salinity. Cold water is denser than warm water because its molecules are more closely packed. Similarly, water with higher salinity is denser than fresher water because the dissolved salts add mass to the same volume of liquid. While pressure also affects density at extreme depths, temperature and salinity are the most important factors for determining the stratification and circulation of water throughout most of the world's oceans.

149. (D) Indian Ocean
The devastating tsunami of December 26, 2004, was triggered by a massive undersea earthquake with an epicenter off the west coast of Sumatra, Indonesia. This earthquake, occurring in the Indian Ocean, was one of the most powerful ever recorded and displaced a colossal volume of water. The resulting tsunami waves traveled across the entire Indian Ocean basin, causing catastrophic destruction and loss of life in numerous countries, including Indonesia, Sri Lanka, India, and Thailand. It remains one of the deadliest natural disasters in history.

150. (A) As water warms, it expands, taking up more volume.
Thermal expansion is a basic physical process where most substances, including water, increase in volume as they absorb heat. As global temperatures rise due to climate change, the oceans absorb a significant portion of this excess energy. As the seawater warms, the molecules move more rapidly and push further apart, causing the total volume of the ocean water to increase. This expansion leads directly to a rise in global sea levels, independent of the water added by melting glaciers and ice sheets.

151. (B) 2, 3, 1
Ocean relief features are typically categorized by their average depths. The continental shelf is the shallowest zone, usually extending from the shore to a depth of about two hundred meters. Abyssal plains occupy the vast majority of the deep ocean floor, with average depths ranging from three thousand to six thousand meters. Oceanic trenches represent the deepest parts of the ocean basins, often descending to depths of seven thousand to eleven thousand meters. This sequence correctly orders these features from shallowest to deepest.

152. (B) The annual range of temperature is higher in the open ocean than in enclosed seas.
The annual temperature range in the ocean is influenced by its size and degree of enclosure. Enclosed or semi-enclosed seas, like the Mediterranean or the Baltic, have a smaller volume of water relative to their surface area and are more influenced by the temperatures of surrounding landmasses. This leads to a higher annual range of temperature compared to the vast, open ocean, where the large volume of water provides significant thermal inertia. Therefore, the statement claiming a higher range in the open ocean is incorrect.

153. (A) P-2, Q-1, R-2, S-1
Ocean currents are classified as warm or cold based on their temperature relative to the surrounding environment and their direction

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Surface salinity is highest in the tropics due to high evaporation and limited rainfall. Similarly, enclosed seas in arid regions, such as the Red Sea, exhibit extreme salinity. The North Sea is saltier than the Baltic Sea because the latter receives massive freshwater from rivers and has limited ocean exchange. However, in low latitudes, salinity does not always decrease with depth; it often increases below the surface layer as denser, saltier water sinks. Therefore, only the first three statements accurately describe salinity patterns.

94. (D) High tide and the following low tide.
The ebb tide refers to the period during the tidal cycle when the water level is falling. This occurs in the interval between the occurrence of a high tide and the subsequent low tide. During this time, water flows away from the shore and out of estuaries or bays back into the open ocean. The opposite of an ebb tide is a flood tide, where the sea level is rising toward high tide. The transition periods between these flows are known as slack water.

95. (A) Latent heat released during condensation.
Tropical cyclones are essentially massive thermal engines fueled by the moisture from warm ocean waters. As warm, moist air rises from the sea surface, it cools and the water vapor condenses to form clouds and rain. This condensation process releases a tremendous amount of latent heat energy into the surrounding atmosphere. This heat warms the air further, causing it to rise more rapidly and lowering the surface pressure. This continuous cycle provides the immense energy needed to sustain and intensify the storm's powerful winds.

96. (B) Continental rise
The continental rise is a major relief feature found at the very base of the continental slope. It consists of a broad, gently sloping wedge of sediments that have been transported down from the continental shelf and slope. These sediment deposits, often moved by turbidity currents, accumulate to form a transition zone between the steep slope and the deep, flat abyssal plain. The continental rise represents the final component of the continental margin, marking where the continent truly ends and the deep ocean floor begins.

97. (B) 32 grams of salt in 1,000 grams of seawater.
Salinity is a measure of the dissolved salt content in seawater and is traditionally expressed in parts per thousand. If a sample has a salinity of thirty-two parts per thousand, it indicates that there are exactly thirty-two grams of dissolved salts contained within one thousand grams of seawater. This ratio remains consistent regardless of the total volume being measured. This standardized unit allows oceanographers to accurately compare salt concentrations across different regions and depths of the world's oceans and and other salty water bodies.

98. (A) Gulf Stream
The Kuroshio Current and the Gulf Stream are analogous ocean currents because they both serve as major warm western boundary currents in their respective basins. The Kuroshio flows along the western edge of the North Pacific, transporting warm tropical waters toward Japan. Similarly, the Gulf Stream flows along the eastern coast of North America in the North Atlantic. Both currents are fast, narrow, and deep, playing crucial roles in transferring massive amounts of heat from the tropics toward higher latitudes and regulating regional climates.

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99. (C) Mixed semi-diurnal tide
A mixed semi-diurnal tide is a specific tidal pattern where a location experiences two high tides and two low tides each lunar day, but with a significant difference in height between the two highs and the two lows. This results in one "higher high" tide and one "lower high" tide, along with corresponding differences in low tide levels. This complex pattern is common along the western coast of North America and many islands in the Pacific, reflecting the influence of local basin geometry and coastal depth.

100. (D) Being in a port or shallow water when the tsunami arrives.
For a ship, the most dangerous place to be during a tsunami is in a port, harbor, or shallow coastal water. As a tsunami enters shallow areas, its speed decreases but its height increases dramatically, often resulting in a massive wall of water or violent surges. These surges can smash vessels against docks or carry them far inland. In contrast, in the deep open ocean, the tsunami's

the world's oceans. This global circulation pattern is essential for redistributing heat, nutrients, and dissolved gases, playing a major role in regulating the Earth's climate on a long-term scale.

161. (B) Wavelength.
A tsunami is characterized by an exceptionally long wavelength, often extending hundreds of kilometers from crest to crest in the open ocean. This is much longer than the wavelengths of wind-driven waves, which are typically only a few hundred meters. This long wavelength is the reason tsunamis behave as shallow-water waves even in the deep ocean and possess enormous energy. While their wave height is low in the open sea, the vast wavelength allows them to travel across entire ocean basins with very little energy loss.

162. (A) Diurnal tide
A diurnal tide is a tidal pattern that consists of one high tide and one low tide during a single lunar day, which lasts approximately twenty-four hours and fifty minutes. This type of tide is less common than the semi-diurnal pattern and is found in specific coastal regions, such as parts of the Gulf of Mexico and the Java Sea. The occurrence of diurnal tides is influenced by the latitude of the location, the declination of the Moon, and the unique shape and depth of the ocean basin.

163. (C) Preventing surface water from becoming dense enough to sink.
The thermohaline circulation is driven by the sinking of cold, salty, and dense water in the North Atlantic. If large amounts of freshwater were added, such as from melting ice sheets, the surface water would become less saline and therefore less dense. Even if this water were very cold, its reduced salinity might prevent it from becoming dense enough to sink. This could potentially disrupt or halt the entire global circulation system, leading to significant changes in heat transport and global climate patterns.

164. (D) Seamounts
Seamounts are isolated, steep-sided mountains that rise from the ocean floor but do not reach the sea surface. Most seamounts are of volcanic origin and are found in deep ocean basins, often in chains or clusters. They provide unique habitats for marine life, as their slopes can attract diverse ecosystems and support upwelling. If a seamount has a flat top due to past wave erosion before it became submerged, it is specifically called a guyot. Seamounts are prominent features of the deep-sea topography.

165. (C) The Moon's revolution around the Earth.
The timing of high and low tides shifts by about fifty minutes each day. This delay occurs because the Moon revolves around the Earth in the same direction that the Earth rotates on its axis. As a result, it takes about twenty-four hours and fifty minutes for a specific point on Earth to rotate back to the same position relative to the Moon. This "lunar day" is the primary reason why tides do not occur at the same time every day, following the Moon's orbital motion instead.

166. (B) Counter-clockwise
In the Northern Hemisphere, the winds of a hurricane or any tropical cyclone rotate in a counter-clockwise direction. This rotation is a result of the pressure gradient force pulling air toward the low-pressure center, while the Coriolis effect deflects the moving air to the right of its path. This interaction creates the characteristic spiral wind pattern that defines these massive storms. In the Southern Hemisphere, the deflection is to the left, which causes the winds in cyclones to rotate in a clockwise direction.

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167. (D) Mid-Ocean Ridge - Site of crustal formation
The Mid-Ocean Ridge is a massive underwater mountain system that marks a divergent plate boundary. At these ridges, tectonic plates pull apart, and magma rises from the mantle to create new oceanic crust. This process is known as seafloor spreading. In contrast, the continental shelf is shallow, abyssal plains have very gentle gradients, and oceanic trenches are the deepest features. Therefore, only the pairing of the mid-ocean ridge with the site of crustal formation is factually and geologically correct within the study of ocean relief.

168. (A) Large influx of freshwater from the Ganges and Brahmaputra rivers.
The Bay of Bengal is known for having relatively low surface salinity compared to the neighboring Arabian Sea. This is primarily due to the massive volume of freshwater discharged into the bay by

several major river systems, most notably the Ganges and Brahmaputra. These rivers carry enormous amounts of freshwater, which dilutes the salt content of the surface waters over a large area. High precipitation during the monsoon season also contributes to this lower salinity by adding more freshwater directly to the ocean surface.

169. (C) Pycnocline
The pycnocline is the layer in the ocean where there is a rapid change in water density with increasing depth. This layer typically lies below the surface mixed layer and acts as a significant barrier between the less dense surface waters and the much denser deep-ocean waters. The change in density is usually driven by sharp changes in either temperature (the thermocline) or salinity (the halocline) occurring in the same depth range. The pycnocline is crucial for controlling the vertical mixing of water and nutrients.

170. (A) It has a low wave height but very fast speed in the open ocean.
In the deep, open ocean, tsunamis move at incredibly high speeds, often exceeding eight hundred kilometers per hour, which is comparable to the speed of a jet airplane. Despite this speed, the wave height is very low, usually less than one meter, and the wavelength is extremely long. Because the wave energy is spread over such a large area, it is almost impossible to see or feel a tsunami from a ship or an aircraft in the open ocean. It only becomes dangerous near land.

171. (B) 1, 3, 4 and 5
The continental shelf is a shallow extension of the land. Abyssal plains are indeed the flattest regions on Earth, and trenches are associated with convergent boundaries where one plate subducts. Mid-ocean ridges are extensive underwater mountain ranges. However, the continental slope is characterized by a very steep gradient, not a gentle one. Therefore, the statement about the continental slope's gradient is incorrect. The other four statements provide accurate descriptions of the major relief features found on the floors of the world's ocean basins.

172. (B) Warmer and more humid.
Warm ocean currents act as a major source of heat and moisture for the air that passes over them. As the current moves from tropical regions toward higher latitudes, it warms the overlying air, which increases its capacity to hold water vapor. When this warm, moist air moves toward the land, it brings higher temperatures and increased humidity to coastal areas. This is why regions influenced by warm currents, like Western Europe, often have much milder and wetter climates than their latitude would normally suggest.

173. (C) The wind
Wind is the primary source of energy for the formation of most waves on the ocean's surface. As wind blows across the water, the friction between the air and the water surface transfers energy, creating ripples that grow into larger waves over time. The size and power of these waves depend on the wind's speed, its duration, and the distance of open water over which it blows. While gravity from the Moon and Sun causes tides, wind remains the fundamental generating force for common ocean waves.

174. (A) Both A and R are true and R is the correct explanation of A.
Over the past century, global sea levels have shown a significant and documented rising trend. This phenomenon is primarily driven by the impacts of global warming. As the planet warms, the oceans absorb a large amount of excess heat, causing the water to expand and take up more volume. Additionally, higher temperatures cause land-based glaciers and the massive ice sheets of Greenland and Antarctica to melt, adding more water to the ocean basins. Both statements accurately describe this current environmental trend and its primary causes.

175. (C) Cold Peru (Humboldt) Current
The extreme aridity of the Atacama Desert is largely due to the influence of the cold Peru Current, also known as the Humboldt Current, which flows along the western coast of South America. Cold ocean currents cool the air above them, making it stable and dense. This stability inhibits the upward movement of air necessary for cloud formation and precipitation. Furthermore, any moisture in the air often condenses into fog rather than falling as rain, creating one of the driest coastal environments on Earth.

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176. (B) Semi-diurnal tide
A semi-diurnal tide is a tidal pattern characterized by two high tides and two low tides each lunar day, with both high tides being of approximately the same height. This is the most common tidal pattern in the world and is found along the coasts of the Atlantic Ocean, including the eastern United States and Europe. This pattern occurs as a point on Earth rotates through the two tidal bulges created by the gravitational interaction with the Moon and the Sun during each daily cycle.

177. (D) Height of the waves generated
The height of wind-driven waves is determined by three key factors: the speed of the wind, the duration for which the wind blows, and the fetch, which is the uninterrupted distance over which the wind moves. A stronger wind blowing for a longer time over a larger distance will transfer more energy to the water surface, resulting in much higher and more powerful waves. These three variables are fundamental in meteorology and oceanography for predicting sea conditions and their potential impacts on coastal areas and navigation.

178. (A) Mariana Trench
The Challenger Deep is the deepest known point in the Earth's oceans, reaching a depth of approximately eleven thousand meters below sea level. It is located at the southern end of the Mariana Trench in the western Pacific Ocean. The Mariana Trench is a deep, crescent-shaped depression formed at a subduction zone where the Pacific Plate is being forced beneath the smaller Mariana Plate. This extreme depth is characterized by intense pressure, total darkness, and near-freezing temperatures, hosting specialized and unique deep-sea organisms.

179. (C) Hydrographic properties
Hydrography is the branch of science that deals with the physical features of bodies of water, including the oceans. In oceanography, the study of the composition of ocean water—specifically its temperature, density, and salinity—is a central part of understanding its hydrographic properties. These factors are critical because they determine how water masses move and interact, drive circulation patterns, and influence the biological and chemical environments. This study is fundamental for modeling ocean behavior and its impact on the global climate and marine life.

180. (A) Storm surge
For low-lying coastal communities, the storm surge is typically the most dangerous and life-threatening hazard associated with a tropical cyclone. A storm surge is a rapid and massive rise in sea level caused by the storm's intense winds and low atmospheric pressure pushing a wall of water onto the land. This surge can happen very quickly, causing widespread and catastrophic flooding that can destroy homes, overwhelm infrastructure, and lead to significant loss of life, often causing more fatalities than the storm's winds themselves.

181. (D) Agulhas - Cold
Ocean currents are classified as warm or cold based on their temperature relative to the surrounding water and their direction of flow. The Kuroshio and Gulf Stream are major warm currents that transport tropical heat toward the poles. The Benguela is a cold current flowing along the southwestern coast of Africa. However, the Agulhas Current is actually a prominent warm current that flows southward along the eastern coast of Africa in the Indian Ocean. Therefore, the pairing of Agulhas as a cold current is incorrect.

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182. (B) The formation of large continental ice sheets.
A eustatic sea-level change is a global fluctuation in sea level caused by a change in the total volume of water in the ocean basins. During glacial periods, a significant amount of water is removed from the oceans and stored on land in the form of massive continental ice sheets and glaciers. This reduction in the volume of liquid water leads to a uniform, worldwide fall in sea level. This process is the primary cause of large-scale sea-level drops throughout the Earth's geological history.

183. (C) Convection
Convection is the process of heat transfer through the mass movement of a fluid, such as water or air. In the ocean, vertical circulation is driven by density differences, where cold, dense water sinks and warmer, less dense water rises to replace it. This vertical movement is a form of convection. It is a critical mechanism for redistributing heat from the surface to the deep

ocean and for bringing nutrients from the depths back up to the surface, supporting marine life across various depths.

184. (D) Thermocline
The thermocline is a distinct layer in the ocean where temperature decreases rapidly with increasing depth. It separates the warm, sunlit surface layer from the consistently cold, deep water below. The thermocline acts as a strong physical barrier that prevents the mixing of these two layers. The depth and intensity of the thermocline vary by season and location, being most permanent in tropical regions and more seasonal in temperate latitudes. It is a fundamental feature of the ocean's vertical temperature and density structure.

185. (A) Underwater seismic events.
The Pacific Tsunami Warning Center primarily monitors underwater seismic activity, especially powerful earthquakes that occur along subduction zones on the ocean floor. These seismic events are the most common cause of tsunamis, as they can suddenly displace large volumes of water. By detecting these earthquakes quickly, scientists can analyze the risk of a tsunami being generated and issue warnings to potentially affected coastal areas. Real-time data from deep-ocean buoys is then used to confirm the presence and size of any actual tsunami waves.

186. (B) Benguela Current
The North Atlantic Gyre is a large-scale system of circulating currents that flows in a clockwise direction. It is composed of four main currents: the Gulf Stream, the North Atlantic Drift, the Canary Current, and the North Equatorial Current. These currents form a continuous loop within the North Atlantic basin. In contrast, the Benguela Current is a cold current located in the South Atlantic Ocean, flowing along the southwestern coast of Africa. Therefore, it is part of the South Atlantic Gyre, not the North Atlantic system.

187. (B) Rotation of the Earth and the orbit of the Moon.
The regular cycle of tides is primarily governed by the gravitational interaction between the Earth, Moon, and Sun. The semi-diurnal cycle of two high and two low tides per day occurs as a point on Earth rotates through two tidal bulges created by this gravitational pull. The period of approximately twelve hours and twenty-five minutes is tied to the lunar day, which is slightly longer than the solar day because of the Moon's own orbital motion around the Earth. These fundamental celestial movements create the predictable rhythm of tides.

188. (A) Continental shelf and slope
Submarine canyons are deep, V-shaped valleys that are carved into the continental margin. They typically originate on the outer continental shelf and descend steeply down the continental slope toward the deep ocean floor. These canyons are significant features because they serve as major pathways for transporting sediments, nutrients, and organic matter from the shallow coastal zones to the deep-sea basins. They are primarily formed by the erosive action of turbidity currents, which are fast-moving, sediment-laden underwater flows that scour the seafloor over long periods of time.

189. (C) Lower than that of freshwater.
The presence of dissolved salts in seawater affects its physical properties, including its freezing point. While pure freshwater freezes at exactly zero degrees Celsius, the addition of salt interferes with the formation of ice crystals, which lowers the freezing temperature. For typical ocean water with a salinity of thirty-five parts per thousand, the freezing point is approximately minus one point nine degrees Celsius. This lower freezing point is a fundamental characteristic of marine environments and has significant implications for sea ice formation and global ocean circulation patterns.

190. (B) 2, 3 and 4
Ocean currents are deflected by the Coriolis force and generally flow toward the equator if they are cold currents. The mixing of warm and cold currents often creates highly productive fishing grounds due to nutrient cycling. However, warm water is less dense than cold water, making the first statement scientifically incorrect. Therefore, only the statements concerning the direction of cold currents, the productivity of mixing zones, and the influence of the Coriolis force are accurate and correct descriptions of how ocean currents behave and impact the marine environment.

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191. (C) A source of warm, moist air over a tropical ocean.
The primary requirement for the formation of a tropical cyclone is the presence of warm, moist air over a tropical ocean surface, typically with temperatures above twenty-six and a half degrees Celsius. This warm water provides the energy needed through evaporation. As the moist air rises and condenses into clouds, it releases latent heat, which fuels the storm's intensification. Without this continuous supply of heat and moisture, the intense convection required to sustain a cyclone's powerful winds and organized structure cannot develop or be maintained.

192. (B) Water particles move in circular orbits that get smaller with depth.
In a deep-water wave, the water particles do not move forward with the wave form. Instead, each particle follows a circular orbital path as the wave energy passes. These orbits are largest at the surface and rapidly decrease in size as the depth increases. This circular motion eventually disappears completely at a depth equal to about half of the wave's wavelength. This distinguishes deep-water waves from shallow-water waves, where the orbital motion becomes elliptical and interacts directly with the seafloor as the wave approaches.

193. (A) Both A and R are true and R is the correct explanation of A.
Coastal regions influenced by cold ocean currents, such as the coast of Peru, are often characterized by exceptionally productive fishing grounds. This occurs because cold currents and offshore winds often trigger upwelling, a process where deep, cold, and nutrient-rich waters are brought to the sunlit surface. These nutrients support massive blooms of phytoplankton, which form the base of a rich marine food web. Both statements accurately describe this relationship and correctly identify upwelling as the primary physical process responsible for the high biological productivity observed in these specific coastal areas.

194. (D) Neap tides
The tidal range is the vertical difference between high and low tide. This range is at its minimum during neap tides. Neap tides occur twice a month when the Moon is in its first or third quarter phases, placing it at a right angle to the Sun relative to the Earth. In this configuration, the gravitational pull of the Sun partially offsets the pull of the Moon, resulting in high tides that are lower than usual and low tides that are higher than usual, thus minimizing the overall tidal range.

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195. (A) Abyssal plains
Abyssal plains are vast, sediment-covered regions of the deep ocean floor, typically found at depths between three thousand and six thousand meters. They are among the flattest and most extensive areas on Earth. These plains are formed by the slow, continuous accumulation of fine-grained sediments, such as clay and the remains of microscopic organisms, which eventually bury the rugged volcanic crust. They cover more than half of the planet's surface and are a major component of the deep-sea landscape, located between continental rises and mid-oceanic ridges.

196. (B) Both A and C are correct for different reasons.
Ocean salinity varies geographically due to the balance of evaporation and precipitation. In equatorial regions, extremely high rainfall adds large amounts of freshwater to the ocean, which significantly lowers the surface salinity. In polar regions, low evaporation and the melting of ice also contribute to lower salinity levels. Conversely, subtropical regions experience high evaporation and low rainfall, which concentrates salt and increases salinity. Therefore, both the equatorial and polar regions are characterized by lower salinity levels compared to the saltier subtropics, though for different physical reasons.

197. (C) A geophysical event
Natural hazards are classified based on the physical processes that trigger them. A landslide into the sea, or an underwater landslide, is a geophysical event driven by gravity and the movement of the Earth's crust or sediments. When such a large volume of material is suddenly displaced, it can push a massive volume of water, generating a tsunami. This differs from meteorological events like cyclones or biological hazards. Therefore, a tsunami caused by a landslide is fundamentally categorized as being triggered by a geophysical process rather than an atmospheric or biological one.

198. (A) P-2, Q-1, R-4, S-3
Basic wave terminology is used to describe the shape and dimensions of ocean waves. The crest is the highest point of the wave, while the trough is the lowest point. Wave height is the vertical distance measured from the trough to the crest. Wavelength is the horizontal distance measured between two successive identical points, such as from crest to crest. Understanding these terms is essential for analyzing wave energy, predicting how waves interact with coastal structures, and studying the physical processes that govern wave motion across the surface of the world's oceans.

199. (C) The vertical movement of the Earth's crust in response to loading or unloading.
Isostatic adjustment is a geological process involving the vertical movement of the Earth's crust to reach a state of gravitational equilibrium within the underlying mantle. This occurs as the crust rises or sinks in response to changes in the weight placed upon it. For example, the addition of a massive ice sheet causes the crust to sink, while the melting of that ice allows the crust to slowly rebound or rise. This adjustment results in localized or regional changes in sea level relative to the land surface.

200. (B) Land-blocked to the north with seasonally reversing circulation patterns.
The Indian Ocean is unique among the world's major oceans because its northern part is completely blocked by the landmass of Asia. This geography prevents the formation of a continuous polar-directed current system like those found in the Atlantic and Pacific. Consequently, the circulation in the North Indian Ocean is dominated by the seasonal monsoon winds, which cause the surface currents to completely reverse their direction twice a year. This seasonally shifting pattern is a distinctive characteristic that sets the Indian Ocean's circulation apart from all other ocean basins.

201. (B) Low temperature, high salinity
The density of seawater is primarily determined by its temperature and its salt content. Cold water is denser than warm water because its molecules are more closely packed. Similarly, water with a higher salinity is denser than fresher water because the dissolved minerals add mass to a given volume of liquid. Therefore, the combination of a low temperature and a high salinity level will result in the highest possible water density. This exceptionally dense water is what typically sinks in polar regions to drive the deep-ocean thermohaline circulation.

202. (A) The massive volume of water and its momentum.
The immense destructive power of a tsunami at the coast is primarily due to the colossal volume of water it moves and the enormous momentum it carries. Unlike a regular wind-driven wave that breaks on the shore, a tsunami involves the entire water column from the seafloor to the surface. When this massive wall or surge of water reaches the land, its momentum allows it to travel far inland with relentless force, easily crushing buildings, uprooting trees, and destroying infrastructure, causing catastrophic damage and loss of life.

203. (C) Inwardly spiraling winds.
A cyclone is a large-scale atmospheric system characterized by a very low-pressure center. Because of the pressure difference, air is drawn from the surrounding high-pressure areas toward the center. As this air moves inward, the Coriolis effect causes it to deflect, resulting in a characteristic spiral pattern. In the Northern Hemisphere, these winds spiral inward in a counter-clockwise direction, while in the Southern Hemisphere, they spiral inward in a clockwise direction. This organized, inwardly spiraling wind pattern is the defining feature of all cyclonic storm systems, including tropical cyclones.

204. (D) The adjacent land is a broad coastal plain.
The width of the continental shelf is strongly influenced by the geological and topographical characteristics of the adjacent landmass. Along coasts where the land is a broad, low-lying coastal plain, the continental shelf tends to be very wide, sometimes extending for hundreds of kilometers. In contrast, along active continental margins where there are high mountains or deep oceanic trenches near the shore, the shelf is usually very narrow or even absent. Therefore, the presence of a wide coastal plain is the most favorable condition for a broad and extensive continental shelf.

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205. (C) Wind and the Coriolis effect.
Surface ocean currents are primarily driven by the friction of prevailing winds blowing across the water's surface, which transfers energy and sets the upper layers in motion. The direction of these currents is then modified by the Coriolis effect, an apparent force caused by the Earth's rotation that deflects moving water to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. Together, wind patterns and the Coriolis effect are the fundamental factors that control the global circulation of the major surface currents and the formation of ocean gyres.

206. (A) 2, 3, 1
In tropical regions, the ocean exhibits a distinct vertical temperature profile. At the surface, there is a warm mixed layer where temperatures are relatively uniform. Below this lies the thermocline, a zone where temperature decreases rapidly with increasing depth. Finally, the deep ocean consists of a vast cold zone where temperatures are consistently low and near freezing. This sequence—surface mixed layer, thermocline, and then the deep cold zone—correctly represents the typical structure of the ocean water column from the surface down to the deep-sea floor in the tropics.

207. (D) Mixed tide
A mixed tide is a specific tidal pattern characterized by two high tides and two low tides each lunar day, but with a significant and marked difference in the heights of the two high waters or the two low waters. This results in one "higher high" tide and one "lower high" tide, as well as one "higher low" and one "lower low" tide. This complex pattern is common along the Pacific coast of North America and many tropical islands, reflecting the influence of local coastline shape and seafloor topography.

208. (A) The extremely high waves and strong winds
For ships at sea, the primary and most immediate hazard from a tropical cyclone comes from the combination of exceptionally strong winds and the resulting extremely high and violent waves. These conditions can easily overwhelm vessels, leading to structural damage, loss of power, or capsizing. While storm surges are catastrophic for coastal areas, they are less of a concern for ships in deep water. The sheer mechanical force of the wind and the mountainous seas present the greatest risk to maritime safety during the passage of a powerful cyclonic storm system.

209. (C) 1, 2 and 4
Eustatic sea-level changes are global fluctuations driven by changes in total ocean water volume, such as thermal expansion or terrestrial ice melt. Isostatic changes are localized adjustments due to vertical crustal movements. However, the melting of sea ice does not significantly contribute to sea-level rise because that ice is already floating and displacing its own weight in water. Therefore, the statement about sea ice contributing to rise is incorrect. The first, second, and fourth statements accurately describe the nature and primary drivers of sea-level changes in the world's oceans.

210. (A) Salinity
Salinity is the property of seawater that measures the total concentration of dissolved salts, and it is traditionally expressed in parts per thousand. This unit indicates the number of grams of salt present in one kilogram of seawater. For example, a salinity of thirty-five parts per thousand means there are thirty-five grams of salt in one thousand grams of water. This standard measurement is fundamental in oceanography as it influences water density, circulation patterns, and the biological adaptations of marine organisms, providing a precise way to compare water chemistry globally.

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211. (D) Mid-Oceanic Ridge system
The Mid-Oceanic Ridge system is a continuous, interconnected underwater mountain range that stretches for over sixty-five thousand kilometers through all of the world's major ocean basins. It is the longest mountain chain on Earth. These ridges are formed at divergent plate boundaries where tectonic plates are pulling apart and new oceanic crust is being created by volcanic activity. This system is a central feature of the global seafloor topography and plays a vital role in the process of seafloor spreading and the tectonic evolution of the planet's crust.

212. (B) A difference in the gravitational pull on opposite sides of the Earth.

of moving objects, such as winds and ocean currents. The strength of this effect is directly related to the sine of the latitude. At the equator, where the latitude is zero, the Coriolis force is also zero, meaning there is no rotational deflection. As one moves toward higher latitudes, the strength of the Coriolis force increases, reaching its maximum value at the North and South Poles. This latitudinal variation is crucial for determining global circulation patterns.

227. (C) Latitude
Latitude is the primary factor influencing the distribution of ocean surface temperatures across the globe. Because the Earth is nearly spherical, the intensity of solar radiation is highest at the equator, where sunlight strikes the surface directly. As one moves toward higher latitudes, the sun's rays are spread over a larger area and pass through more of the atmosphere, resulting in less heating. This creates a clear temperature gradient, with the warmest waters found in tropical regions and the coldest waters located in the polar regions, following the latitudinal lines.

228. (D) North Atlantic Drift
The North Atlantic Drift is a powerful warm ocean current that is an extension of the Gulf Stream. It flows across the North Atlantic toward the coasts of Northern and Western Europe. This current transports massive amounts of warm tropical water into the higher latitudes. As the prevailing winds blow over this warm water, they absorb heat and moisture, which is then carried onto the land. This process significantly moderates the European climate, ensuring that winters are much milder than those in other regions at similar latitudes, such as parts of Canada.

229. (C) The ship would rise and fall gently over a period of many minutes.
In the deep open ocean, a tsunami has a very long wavelength and a very low wave height, often less than one meter. Because the energy is spread over such a vast distance, the passage of the wave is subtle. A ship in deep water would only experience a gentle, gradual rise and fall of the sea level over a period of ten to thirty minutes. This movement is so slow and slight that it is often completely unnoticeable to those on board, making the deep ocean the safest place for a ship during a tsunami.

230. (A) Transporting heat and regulating global climate.
The thermohaline circulation is a slow but massive deep-ocean current system that connects all the world's oceans. It is driven by differences in water density caused by temperature and salinity. This "global conveyor belt" plays a critical role in Earth's climate system by transporting enormous amounts of heat from the tropics to the polar regions. It also helps sequester carbon dioxide in the deep ocean and redistributes nutrients globally. This large-scale circulation is essential for maintaining the relative stability of the global climate over long periods of time.

231. (D) Continental Shelf
The continental shelf is the shallowest part of the ocean basin, representing the submerged extension of the continental landmass. It descends gently from the coastline with a very slight gradient, typically to a depth of about two hundred meters. The width of the shelf varies significantly around the world, being widest along broad coastal plains and narrowest near mountainous coastlines. Because it is shallow and sunlit, the shelf is the most biologically productive part of the ocean and contains significant resources like fisheries and petroleum deposits.

232. (B) The Earth's daily rotation through the two tidal bulges created by the Moon.
The most common tidal pattern is the semi-diurnal cycle, featuring two high tides and two low tides each day. This occurs because the Moon's gravitational pull, combined with centrifugal force, creates two tidal bulges on opposite sides of the Earth. As the Earth rotates on its axis once every twenty-four hours, a specific coastal location will pass through both of these bulges. This rotation creates the rhythmic rise and fall of the sea level twice daily. The Sun also contributes to this process, though the Moon's influence is more dominant.

233. (C) Eye
The eye is the unique, circular region located at the very center of a mature tropical cyclone. It is characterized by the lowest atmospheric pressure found within the entire storm system. Within the eye, weather conditions are surprisingly calm, with clear skies or light clouds and relatively

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El Niño is a major climate phenomenon characterized by the periodic appearance of unusually warm surface waters in the central and eastern equatorial Pacific Ocean. This warming occurs when the trade winds weaken, allowing warm water that is normally trapped in the western Pacific to flow eastward toward the coast of South America. This shift in ocean temperatures significantly disrupts global weather patterns, leading to heavy rains in some regions and severe droughts in others, and it has profound impacts on marine ecosystems and commercial fisheries across the Pacific basin.

220. (B) 2, 3 and 4
Tides have much longer wavelengths than wind-driven waves and are caused by the gravitational attraction of the Sun and Moon. Additionally, a wave's energy is directly related to its height. However, wind is not the primary generating force for tides, and wave motion in deep water involves the orbital movement of particles rather than a significant net transport of water. Therefore, only the statements regarding the wavelength, energy, and gravitational cause of tides are factually correct. The first and fifth statements contain common misconceptions about wave and tide mechanics.

221. (D) Cold current flowing equatorward.
The Benguela Current is a major cold ocean current that flows along the southwestern coast of Africa in the South Atlantic Ocean. It transports cooler water from the higher latitudes near the Southern Ocean toward the equator. This current is a key component of the South Atlantic Subtropical Gyre and is associated with intense coastal upwelling, which brings nutrient-rich deep water to the surface. These nutrients support a highly productive marine ecosystem and important commercial fisheries, while also contributing to the arid climate of the neighboring Namib Desert.

222. (A) Temperature
An isotherm is a line on a map or chart that connects points experiencing the same temperature at a given time or over a specific period. In oceanography, isotherms are used to visualize the distribution of sea surface temperatures across the globe. These lines help identify warm and cold currents, the boundaries of different water masses, and the extent of seasonal warming and cooling. Similar to how isobars show pressure or isohalines show salinity, isotherms provide a clear and essential visual representation of the ocean's thermal structure and patterns.

223. (C) Shelf, Slope, Rise, Plain
When traveling from the edge of a continent to the deep ocean floor, the relief of the seafloor typically follows a specific sequence. It begins with the shallow and gently sloping continental shelf. This is followed by the continental slope, which marks a much steeper descent. At the base of the slope is the continental rise, a wedge of accumulated sediment with a more moderate gradient. Finally, the terrain levels out into the vast and remarkably flat abyssal plain, which constitutes the majority of the deep ocean floor basins.

224. (D) Powerful hurricane
A tsunami is a series of massive waves generated by the sudden displacement of a large volume of water. Common causes include powerful submarine earthquakes, volcanic eruptions on islands or on the seafloor, and massive coastal or underwater landslides. While a powerful hurricane can cause a dangerous storm surge and high waves, it does not physically displace the water column in the same way that seismic or volcanic events do. Therefore, a hurricane is not considered a direct cause of a tsunami, as its primary impacts are driven by wind and atmospheric pressure.

225. (A) Astronomical tide
A storm surge is an abnormal and often dangerous rise in sea level that occurs during a powerful storm, such as a cyclone or hurricane. This rise is measured as the height of the water above the level of the predicted astronomical tide, which is the normal rise and fall caused by the gravity of the Sun and Moon. The total water level reached during a storm is the combination of the surge and the tide. If a storm surge coincides with a high tide, the resulting coastal flooding can be particularly catastrophic and destructive.

226. (B) Poles
The Coriolis effect is an apparent force caused by the Earth's rotation that deflects the path

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The fundamental cause of tides is the difference in the gravitational pull exerted by the Moon and the Sun on various parts of the Earth. Because gravity decreases with distance, the side of the Earth closer to the Moon experiences a stronger pull than the side further away. This gravitational gradient creates a stretching effect, resulting in two tidal bulges: one on the side facing the Moon and one on the opposite side. As the Earth rotates through these bulges, coastal regions experience the rhythmic rise and fall of the sea level.

213. (A) Both A and R are true and R is the correct explanation of A.
Tropical cyclones are essentially massive heat engines that derive their energy from the evaporation of warm ocean water and the subsequent release of latent heat. When a cyclone moves over land, it is suddenly cut off from its primary source of moisture and thermal energy. Additionally, the increased friction with the land surface disrupts the storm's organized wind circulation. Consequently, the cyclone quickly loses its intensity and begins to dissipate. Both statements accurately describe this process and correctly identify the loss of the ocean energy source as the primary reason for the storm's weakening.

214. (D) Kuroshio Current
The California Current and the Kuroshio Current are located on opposite sides of the North Pacific Ocean and play contrasting roles. The California Current is a cold current that flows southward along the western coast of North America, bringing cooler water from higher latitudes. Its warm-water counterpart is the Kuroshio Current, a powerful western boundary current that flows northward along the eastern coast of Asia and Japan. The Kuroshio transports warm tropical waters toward the poles, significantly influencing the regional climate of East Asia and the North Pacific basin.

215. (A) Upwelling or downwelling
While horizontal movements of water are known as currents, the vertical movement of ocean water is referred to as upwelling or downwelling. Upwelling occurs when deep, cold, and nutrient-rich water rises toward the surface, typically driven by winds pushing surface water away from a coast. Downwelling is the opposite process, where surface water sinks into the deeper ocean, often occurring when water becomes very cold and salty, increasing its density. These vertical flows are essential for cycling nutrients and gases and for driving the global deep-ocean circulation patterns.

216. (B) Oceanic Trench
An oceanic trench is a long, narrow, and exceptionally deep depression found on the ocean floor. These features are the deepest parts of the world's oceans and are typically formed at subduction zones, where one tectonic plate is being forced beneath another. Trenches are often associated with volcanic arcs and intense seismic activity. They represent the sites where oceanic crust is recycled back into the Earth's mantle. The most famous example is the Mariana Trench in the Pacific, which contains the planet's deepest known point, the Challenger Deep.

217. (B) Pressure
The density of seawater is primarily determined by three physical variables: its temperature, its salinity, and its pressure. While temperature and salinity are the dominant factors in the upper layers of the ocean, pressure becomes increasingly important at greater depths. Because water is slightly compressible, the immense weight of the overlying water column at extreme depths increases the density of the water below. Understanding how these three factors interact is essential for accurately modeling ocean stratification, deep-water circulation, and the transmission of sound through the marine environment.

218. (A) Tsunami
A sudden and dramatic withdrawal of water from a coastline, which can expose the seafloor and leave fish stranded, is a well-known and critical natural precursor to the arrival of a tsunami. This recession, or drawback, occurs when the trough of the tsunami wave reaches the shore before the crest. It is a sign that the massive wave is drawing water toward itself to build its final height before striking. This natural warning signal provides a vital few minutes for people on the coast to evacuate to higher ground before the destructive wave arrives.

219. (C) Pacific Ocean

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weak winds. This calm is caused by air gently descending from the upper atmosphere, which suppresses the formation of thunderstorms. The eye is surrounded by the eyewall, where the most intense winds and heaviest rainfall of the cyclone are concentrated.

234. (D) Temperature, density, and salinity of seawater.
In the field of oceanography, when discussing the "composition" of ocean water, scientists are primarily referring to its fundamental physical and chemical properties. These include temperature, which reflects the heat content; salinity, which is the concentration of dissolved salts; and density, which is determined by the combination of temperature, salinity, and pressure. These properties are critical because they dictate how water masses move, how they are stratified, and how they interact with the atmosphere and marine life, forming the basis for understanding the ocean's physical environment.

235. (A) Cold currents and have arid or semi-arid climates.
The west coasts of continents in subtropical latitudes are typically influenced by cold ocean currents that flow from polar regions toward the equator. These cold currents cool the air above them, making it stable and inhibiting the vertical movement of air required for rainfall. Consequently, these regions, such as the coasts of California, Chile, and Northwest Africa, are often characterized by very dry, arid, or semi-arid climates. The presence of cold water also frequently leads to the formation of coastal fog while preventing the development of significant rain-producing storm systems.

236. (B) A strong wind blowing for a long time over a large area.
Most ocean waves are generated by wind, and the size of these waves is determined by three main factors: wind speed, duration, and fetch. Fetch is the uninterrupted distance over which the wind blows. When a very strong wind blows consistently for a long period over a large, open area of water, it transfers a massive amount of energy to the surface. This allows ripples to grow into large, powerful waves and eventually into massive swells that can travel across entire ocean basins. This is the primary mechanism for creating large-scale ocean waves.

237. (B) Eustatic change
A eustatic change in sea level is a global fluctuation that affects all of the world's oceans simultaneously and uniformly. This type of change occurs when the total volume of water within the ocean basins is altered. The melting of a massive land-based ice sheet, such as the one covering Antarctica, adds an enormous volume of freshwater to the oceans, causing a worldwide rise in sea level. This is a classic example of eustatic change and is distinct from localized isostatic changes caused by the vertical movement of the Earth's crust in specific regions.

238. (A) Increasing pressure increases density.
The density of seawater is influenced by temperature, salinity, and pressure. While water is often considered incompressible, it does compress slightly under the immense weight of the overlying water column at great depths. Therefore, as pressure increases with depth, the water molecules are pushed closer together, which directly results in an increase in density. In contrast, increasing temperature typically decreases density, and increasing salinity increases density. Density is also not at its maximum at zero degrees for salty ocean water, as it is for pure freshwater.

239. (C) Vertical displacement of the seafloor during an earthquake.
The most common cause of a tsunami is a powerful undersea earthquake that results in a sudden vertical displacement of the seafloor. When a block of the oceanic crust is abruptly shifted upward or downward, usually at a subduction zone, it pushes or pulls the entire column of water above it. This massive displacement of water creates a series of long-wavelength waves that propagate outward across the ocean at high speeds. Horizontal movement of the seafloor is much less likely to generate a tsunami because it does not displace a large volume of water.

240. (D) Thermocline
The thermocline is a vital vertical layer in the ocean characterized by a rapid decrease in temperature as depth increases. It acts as a primary boundary separating the warm, well-mixed surface layer from the consistently cold, dense water of the deep ocean. This thermal stratification is fundamental to oceanography

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human-induced climate change. This warming leads to the melting of glaciers and continental ice sheets, adding more water to the oceans. Additionally, it causes the thermal expansion of seawater. Both processes contribute to the global rise in sea levels observed today, posing significant challenges to coastal communities and ecosystems worldwide.

294. (B) A fall in local sea level relative to the land
Glacial isostasy causes the Earth's crust to rebound upward after the immense weight of an ice sheet is removed by melting. As the land rises, the sea level in that specific region appears to drop relative to the land surface. This is a local isostatic effect, meaning that even if global sea levels are rising, certain regions might experience a relative fall in sea level.

295. (C) The thermal expansion of ocean water
Beyond the melting of ice sheets, thermal expansion is a major contributor to eustatic sea level rise during warm periods. As ocean water absorbs heat from the atmosphere, its temperature increases, causing the water molecules to move more vigorously and occupy more volume. This expansion of the existing water mass leads to a global rise in sea level, independent of any added freshwater input.

296. (D) A large submarine earthquake
The most frequent cause of a tsunami is a large submarine earthquake, particularly one that occurs at a convergent plate boundary. When tectonic plates shift vertically, they abruptly displace a massive volume of water above the seafloor. This displacement generates a series of powerful, long-wavelength waves that travel across the ocean at high speeds, eventually growing in height as they reach shallow coastal waters.

297. (A) A significant Coriolis force
Tropical cyclones cannot form at the equator because the Coriolis force is zero at that latitude. This force is essential for initiating the rotation of the storm system. Without the Coriolis effect to deflect the moving air, the low-pressure center cannot develop the organized circular motion required to become a cyclone, even if the sea surface temperatures are sufficiently warm to provide energy.

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298. (B) Its speed decreases, and its height increases.
As a tsunami wave approaches the coastline and enters shallower water, its behavior changes dramatically due to interaction with the seafloor. The friction from the rising bottom causes the wave's speed to decrease significantly. Because the energy must be conserved, the wave's height increases rapidly, often resulting in a wall of water that can cause catastrophic destruction and inundation upon reaching the shore.

299. (B) Vertical displacement of the seafloor
Vertical displacement of the seafloor is a geological event associated with submarine earthquakes and the generation of tsunamis, not a hazard caused by tropical cyclones. Cyclones are atmospheric storm systems characterized by high-velocity winds, torrential rainfall, and storm surges. While they cause immense damage to coastal regions, their primary mechanisms of destruction are meteorological rather than tectonic in nature, distinguishing them from seismic hazards.

300. (A) Warm sea surface temperatures above 26.5°C
The formation of a tropical cyclone requires warm sea surface temperatures, typically above 26.5°C, to provide the necessary heat and moisture energy. This warm water acts as the fuel for the storm, as the rising moist air releases latent heat through condensation, which further strengthens the system. This specific oceanic condition is why these intense storms only form over tropical and subtropical waters.

248. (A) Crest and trough.
Wave height is a fundamental measurement used to describe the vertical size and energy of an ocean wave. It is defined as the vertical distance between the highest point of the wave, called the crest, and the lowest point, called the trough. This dimension is a direct indicator of the amount of energy the wave is carrying across the ocean surface. Factors such as wind speed and fetch determine how high a wave can grow, and larger wave heights generally result in more powerful impacts on shorelines and vessels.

249. (C) Tsunami
A tsunami is a specific type of marine hazard characterized by a series of ocean waves with extremely long wavelengths and periods. These waves are generated by the sudden displacement of a large volume of water, most commonly due to submarine earthquakes, volcanic eruptions, or underwater landslides. Unlike wind-driven waves that only affect the surface, a tsunami involves the movement of the entire water column. In the open ocean, they travel at high speeds but have low heights, becoming destructive only as they enter shallow coastal waters and surge onto land.

250. (A) Density differences
The circulation of the deep ocean is primarily driven by differences in water density, a process known as thermohaline circulation. Density is determined by the temperature and salinity of the water. In polar regions, seawater becomes very cold and salty, increasing its density and causing it to sink to the deep ocean floor. This sinking water then flows toward the equator, eventually upwelling in other regions. This slow, large-scale movement is often called the "global conveyor belt" and is essential for the long-term redistribution of heat and nutrients.

251. (B) The Continental Slope
The continental slope serves as the true boundary of the continental block, extending from the edge of the shelf down toward the ocean floor. It is characterized by a significantly steeper gradient compared to the continental shelf, typically ranging between two and five degrees. This zone marks where the continental landmass ends and the deep ocean basin truly begins.

252. (A) Its rich biological and mineral resources
Continental shelves possess immense economic value because they are shallow and receive abundant sunlight, fostering rich biological productivity and extensive fishing grounds. Furthermore, these regions are significant sources of vital mineral resources and large petroleum deposits. Their accessibility and natural wealth make them the most commercially exploited part of the marine environment, providing significant global resources for human use.

253. (C) By the erosional action of turbidity currents
Submarine canyons are deep, narrow valleys cut into the continental slope and are often found near the mouths of large rivers. Scientific consensus suggests these features are primarily formed through the erosional power of turbidity currents. These currents consist of dense, sediment-laden water that flows rapidly down the slope, carving out these immense underwater gorges over geological time.

254. (D) Continental Shelf, Continental Slope, Continental Rise, Abyssal Plain
Moving from the coastline toward the deep ocean, the seafloor follows a specific sequence of geomorphic divisions. It starts with the shallow continental shelf, followed by the steeper continental slope. Next is the continental rise, where sediments accumulate at the base of the slope. Finally, the journey reaches the abyssal plain, which constitutes the vast, deep ocean floor.

255. (C) Its exceptional flatness and fine-grained sediment cover
The abyssal plain is the most extensive and flat portion of the ocean floor, located at extreme depths. These plains are remarkably featureless because they are buried under thick layers of fine-grained sediments, primarily consisting of clay and silt. This unique combination of extreme flatness and specific sediment composition distinguishes these regions from the more rugged features of the seafloor.

256. (B) Oceanic Trench
Oceanic trenches are long, narrow, and exceptionally deep depressions located at convergent plate boundaries. These features represent the deepest parts of the global ocean and form when one tectonic plate subducts

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because it limits the vertical mixing of water masses, thereby influencing the distribution of nutrients, dissolved gases, and marine organisms. The intensity and depth of the thermocline vary significantly based on latitude and seasonal changes in solar radiation.

241. (C) Pacific Ocean
The Pacific Ocean is the largest and deepest of the Earth's five ocean basins, covering more than thirty percent of the planet's surface. It contains more than half of the world's free water and reaches its greatest depth in the Mariana Trench, which includes the Challenger Deep at approximately eleven thousand meters. The Pacific is characterized by vast open spaces and is fringed by the "Ring of Fire," a region of intense tectonic activity including numerous trenches, volcanoes, and earthquakes due to its active plate boundaries.

242. (B) New Moon and Full Moon
Spring tides are characterized by the largest tidal range of the lunar month, meaning they have the highest high tides and the lowest low tides. This phenomenon occurs twice every month during the new moon and full moon phases. At these times, the Earth, Moon, and Sun are aligned in a straight line. This celestial configuration allows the gravitational pull of the Sun to reinforce the gravitational pull of the Moon, creating the maximum combined force on the Earth's oceans and resulting in the greatest tidal bulges.

243. (C) The latent heat of condensation of water vapor.
Tropical cyclones are powerful atmospheric systems that derive their energy from the heat of the tropical oceans. As warm, moist air rises from the sea surface, it cools and the water vapor condenses into clouds and rain. This condensation process releases a massive amount of latent heat energy into the surrounding air, which further warms the atmosphere and causes more air to rise. This continuous cycle acts as a powerful thermal engine, providing the energy needed to sustain and intensify the storm's violent winds and heavy precipitation.

244. (D) Isostatic subsidence
Isostatic subsidence is a localized vertical movement where the Earth's crust sinks in response to the addition of a heavy load. A classic example is the gradual sinking of a river delta as it accumulates thick layers of heavy sediment over thousands of years. This added weight exceeds the buoyancy of the crust, causing it to descend into the underlying mantle. This process results in a local rise in sea level relative to the sinking land, and it is a distinct geophysical process separate from global eustatic changes in sea level.

245. (C) Brazil Current - Cold Current
Ocean currents are classified as warm or cold based on their temperature relative to the environment they flow through. The Gulf Stream is a well-known warm current, while the Peru and Canary currents are major cold currents. However, the Brazil Current is actually a warm ocean current that flows southward along the eastern coast of South America, transporting tropical heat toward higher latitudes. Therefore, the pairing of the Brazil Current as a cold current is factually incorrect and represents an error in current classification.

246. (B) Divergent plate boundary
The Mid-Atlantic Ridge is a classic example of a divergent plate boundary, where tectonic plates are pulling apart from each other. As the plates separate, magma rises from the mantle to fill the gap, cooling and solidifying to create new oceanic crust in a process called seafloor spreading. This continuous volcanic activity has created a massive, elevated mountain range that runs through the center of the Atlantic Ocean. This geological feature is essential for understanding the movement of Earth's plates and the gradual expansion of ocean basins over time.

247. (D) Parallel to the wind direction.
On the real Earth, surface ocean currents are deflected by the Coriolis effect, which is caused by the planet's rotation. In the Northern Hemisphere, currents are deflected to the right, and in the Southern Hemisphere, they are deflected to the left. However, if the Earth did not rotate, this Coriolis force would not exist. In such a scenario, the surface currents would not curve or form large-scale circular gyres; instead, they would tend to flow in a straight line, moving directly parallel to the direction of the prevailing winds.

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distribution of land and water, prevailing wind patterns, and the movement of ocean currents. Together, these elements modify the expected temperature trends, creating a highly varied and dynamic thermal environment.

266. (B) The thermocline
The thermocline is a distinct vertical layer in the ocean where temperature decreases rapidly with increasing depth. It serves as a transition zone between the warm, sunlit surface waters and the cold, dark deep water below. This steep temperature gradient is a fundamental feature of the ocean's thermal structure, particularly in tropical and temperate regions where surface heating is most significant.

267. (B) To act as a density barrier inhibiting vertical mixing
The thermocline functions as a significant density barrier because the rapid change in temperature creates a sharp difference in water density. This stratification inhibits the vertical mixing of water between the warm upper layer and the cold deep layer. By preventing this exchange, the thermocline maintains the distinct chemical and physical properties of the different layers within the global ocean's vertical structure.

268. (A) it is composed of dense water that sinks in polar regions.
The deep water layer maintains a uniformly cold temperature because it consists of water that originated in polar regions. In these high latitudes, surface water becomes extremely cold and dense, causing it to sink and flow slowly along the ocean floor toward the equator. This insulation from solar radiation ensures that the temperature remains just a few degrees above freezing point.

269. (C) Tropical oceans
In tropical oceans, the thermocline is a permanent feature because the surface waters receive intense solar radiation throughout the year. This consistent heating maintains a warm upper layer, creating a sharp and enduring temperature gradient with the cold deep water. In contrast, mid-latitude regions may only experience a strong thermocline seasonally during the warmer months when surface heating is more pronounced.

270. (D) Solar radiation and wind-induced mixing
The upper layer of the ocean, or epipelagic zone, stays warm and relatively uniform due to the direct penetration of solar radiation. Additionally, the constant action of winds and waves mixes the water, distributing the absorbed heat evenly throughout this top layer. These physical processes ensure that the temperature remains stable before reaching the rapid cooling zone of the underlying ocean thermocline.

271. (C) The formation of sea ice
The formation of sea ice increases ocean salinity through a process called brine rejection. When seawater freezes, the salt molecules are excluded from the ice crystal structure and expelled into the surrounding water. This increases the concentration of salt in the remaining liquid, making it more saline and dense, which subsequently influences the vertical movement and circulation of polar ocean waters.

272. (B) Subtropical regions
Subtropical regions typically exhibit the highest surface salinity levels because they experience intense evaporation combined with very low precipitation. The high temperatures in these areas cause water to evaporate rapidly, leaving behind dissolved salts and increasing the concentration. This process is characteristic of the "horse latitudes," where high-pressure systems dominate, leading to dry conditions and elevated salt content in surface waters.

273. (D) salinity changes rapidly with depth
The halocline is a specific vertical zone in the ocean where salinity levels undergo a rapid change over a relatively small increase in depth. Much like the thermocline for temperature, the halocline creates a stratified environment that can affect water density and vertical mixing. This feature is particularly prominent in areas where there is a significant input of freshwater at the surface.

274. (A) A large inflow of freshwater from rivers
The Baltic Sea is known for its significantly lower salinity compared to the open ocean primarily because it receives a massive inflow of freshwater from numerous surrounding rivers. This constant addition of fresh water dilutes the existing seawater. Furthermore, the sea's

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or bio-productivity at each trophic level.
2. A linear sequence of organisms where nutrients and energy are transferred from one organism to another.
3. The position an organism occupies in a food web.
4. A system of interlocking and interdependent food chains.

Codes:
(A) P-2, Q-4, R-1, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-3, R-4, S-1

9. Which of the following is an example of a primary consumer in a terrestrial ecosystem?
(A) A lion
(B) A mushroom
(C) A rabbit
(D) An oak tree

10. Which of the following statements about Deep Ecology is incorrect?
(A) It promotes a human-centered (anthropocentric) view of the environment.
(B) It emphasizes the inherent worth of all living beings regardless of their utility to humans.
(C) It advocates for a significant decrease in human population.
(D) It critiques shallow environmentalism for focusing only on pollution and resource depletion.

11. The phenomenon where temperatures in urban areas are significantly higher than in surrounding rural areas is known as:
(A) Global Warming
(B) Atmospheric Inversion
(C) Land Degradation
(D) Urban Heat Island

12. Consider the following statements regarding a food web:
1. It is a more realistic representation of feeding relationships in an ecosystem than a food chain.
2. An organism can occupy multiple trophic levels within a food web.
3. The removal of one species from a food web has no effect on other species.
4. It illustrates a single pathway of energy flow.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2, and 4
(D) 1 and 3 only

13. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The amount of energy transferred from one trophic level to the next is typically only about 10%.
Reason (R) : A significant amount of energy is lost as heat during metabolic processes at each trophic level.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

14. Particulate matter (PM2.5 and PM10) is a major component of which type of environmental hazard?
(A) Water Pollution
(B) Land Degradation
(C) Urban Heat Island
(D) Atmospheric Pollution

15. What is the primary cause of cultural eutrophication, a form of water pollution?
(A) The runoff of nutrient-rich fertilizers from agricultural lands.
(B) The release of toxic heavy metals from complex industrial processes.
(C) The increase of water temperature from power plant cooling systems.
(D) The accidental leakage of crude oil from maritime transport tankers.

16. Which of the following represents a human impact leading to land degradation?
(A) Afforestation
(B) Overgrazing
(C) Crop rotation
(D) Contour ploughing

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Based on the general patterns of global ocean circulation, currents that flow from high-latitude polar regions toward the equator along the eastern sides of ocean basins are classified as cold currents. These currents carry chilled water into warmer tropical regions, significantly influencing the local climate and marine ecosystems of the adjacent coastal landmasses by moderating temperatures and bringing nutrient-rich waters from the poles.

285. (C) Gyres
Gyres are large, circular surface current systems that dominate the major ocean basins. They are formed by the combined influence of planetary wind patterns, the Coriolis force, and the positioning of continental landmasses. These massive circulation cells play a vital role in redistributing heat from the tropics to the poles and are a central feature of the Earth's surface ocean current system today.

286. (D) Energy transfer from wind
Most ocean waves are generated by the transfer of energy from the wind to the water's surface. As wind blows over the ocean, friction and pressure differences cause ripples that grow into larger waves. The final size of these waves depends on the wind's speed, the duration it blows, and the fetch, which is the distance of open water the wind travels.

287. (C) When the Sun, Moon, and Earth are in alignment
Spring tides occur when the gravitational pulls of the Sun and the Moon are combined because they are aligned with the Earth. This alignment happens during the new moon and full moon phases. The reinforced gravitational force creates the maximum tidal range, resulting in the highest high tides and the lowest low tides experienced during the lunar month across the world's coastal regions.

288. (B) Wavelength
Wavelength is the term used to describe the horizontal distance between two consecutive wave crests or two consecutive wave troughs. It is a fundamental characteristic used to define the scale and behavior of ocean waves. Wavelength, along with wave height and period, helps oceanographers determine the amount of energy carried by a wave and how it will interact with the coastline upon arrival.

289. (D) The wave form and its energy
As a wave moves across the ocean, the individual water particles primarily move in small circular orbits rather than traveling long distances. It is the wave form and the energy transferred from the wind that actually propagate forward through the water. This explains how wave energy can travel thousands of miles across open basins while the actual water remains relatively in the same general location.

290. (A) the gravitational forces of the Sun and Moon being at right angles.
Neap tides are characterized by the smallest tidal ranges, occurring when the gravitational forces of the Sun and the Moon act at right angles to each other relative to the Earth. This happens during the first and third quarter moon phases. Because the two gravitational pulls partially cancel each other out, the resulting high tides are lower and the low tides are higher than average.

291. (C) Eustatic change
A eustatic sea level change refers to a global variation in the total volume of water in the world's oceans. The melting of continental ice sheets during warm interglacial periods adds vast amounts of water to the basins, causing a worldwide rise in sea level. This type of change is uniform across the globe, unlike localized movements caused by tectonic activity or crustal rebound.

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292. (A) Eustatic change involves a change in ocean water volume, while isostatic change involves land movement.
The fundamental difference lies in the cause of the relative sea level shift. Eustatic change is a global phenomenon driven by changes in the actual volume of ocean water, often due to climate variations. Isostatic change, however, is a localized or regional effect caused by the vertical movement of the Earth's crust itself, such as during tectonic activity or after the removal of ice.

293. (D) Anthropogenic warming and its effects
Contemporary eustatic sea level rise is primarily driven by anthropogenic warming, which is

restricted connection to the Atlantic Ocean limits the exchange of saltier water, maintaining its status as a brackish water body.

275. (C) Isohalines
Isohalines are lines drawn on a map that connect different geographic points having the same salinity values. These lines help oceanographers visualize and study the horizontal distribution of salt concentrations across different regions of the ocean. By observing the patterns of isohalines, researchers can identify areas of high evaporation, heavy river discharge, or the influence of major ocean currents on salinity.

276. (A) Temperature and salinity
Ocean water density is primarily controlled by two dominant factors: temperature and salinity. Cold water is denser than warm water because its molecules are more closely packed. Similarly, highly saline water is denser than fresh water due to the added mass of dissolved salts. Together, these two variables determine the buoyancy of water masses and drive the global patterns of ocean circulation.

277. (D) Cold and highly saline water
The densest water in the global ocean is produced when water is both extremely cold and has a high concentration of dissolved salts. These conditions typically occur in polar regions during the winter. As sea ice forms, it expels salt into the already cold water, creating a very dense brine that sinks to the ocean floor, initiating deep-water thermohaline circulation across the globe.

278. (B) A layer where density increases rapidly with depth
A pycnocline is a vertical layer in the ocean where water density increases sharply with depth. This layer is often associated with the thermocline and halocline, as changes in temperature and salinity directly influence density. The pycnocline acts as a stable barrier that limits the vertical mixing between the less dense surface waters and the much denser waters found in the deep ocean.

279. (C) In the great depths of the ocean
Although temperature and salinity are the primary drivers of density near the surface, pressure becomes a significant factor at great ocean depths. The immense weight of the overlying water column compresses water molecules slightly, leading to an increase in density. This effect is most pronounced in the deepest parts of the ocean basins, where pressures are hundreds of times greater than at sea level.

280. (D) The thermocline circulation
The sinking of cold, dense, and highly saline water in polar regions is the fundamental driver of thermohaline circulation. This process, often referred to as the "global conveyor belt," involves the slow movement of deep water from the poles toward the equator and throughout the world's ocean basins. It plays a crucial role in redistributing heat and nutrients around the entire planet's surface.

281. (A) Friction from planetary winds
Surface currents are primarily driven by the friction generated as planetary winds blow across the surface of the ocean. These winds transfer their kinetic energy to the water, setting the upper few hundred meters in motion. While other factors like the Coriolis force and continental boundaries modify the direction of these currents, the initial force responsible for their movement is atmospheric circulation.

282. (B) To the left
The Coriolis force, caused by the Earth's rotation, deflects all moving objects and fluids on the planet's surface. In the Southern Hemisphere, this force results in a deflection to the left of the direction of motion. This phenomenon is essential for understanding the clockwise and counter-clockwise rotation of major ocean gyres and atmospheric weather systems in both the northern and southern planetary halves.

283. (B) Differences in water density
Thermohaline circulation is driven by differences in water density, which are caused by variations in temperature and salinity. Cold and salty water is denser and tends to sink, while warmer or less saline water remains near the surface. This density-driven vertical movement creates a slow, continuous circulation of water throughout the global ocean basins, connecting the surface and deep layers of the marine environment.

284. (A) a cold current.

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CHAPTER 04

Geography of Environment

1. Which of the following best defines an ecosystem in a geographic context?
(A) A group of organisms residing in a specific localized environment.
(B) A community of organisms interacting with non-living environmental components as a system.
(C) The total combined land and water surface area of an entire continent.
(D) The academic study of human settlements and their spatial distribution patterns.

2. Read the given statements and select the correct option.
Statement I : Human ecology is the study of the relationships between humans and their natural, social, and built environments.
Statement II : Human ecology focuses exclusively on the impact of pre-industrial societies on their surroundings.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

3. In the context of ecosystem functions, what is a trophic level?
(A) The rate at which an ecosystem's producers capture and store energy.
(B) The total mass of organisms in a given area or volume.
(C) The position an organism occupies in a food chain.
(D) The geographic area over which a species can be found.

4. The flow of energy in an ecosystem is best described as:
(A) Cyclic
(B) Reversible
(C) Bidirectional
(D) Unidirectional

5. Which of the following is NOT a primary component of a geo-chemical cycle?
(A) The movement of chemical elements through the Earth's atmosphere, hydrosphere, and lithosphere.
(B) The transformation of chemical elements into organic compounds by living organisms.
(C) The transfer of energy from one trophic level to another.
(D) The return of chemical elements to their inorganic state through decomposition.

6. Identify the primary process by which carbon is removed from the atmosphere and incorporated into the biosphere.
(A) Respiration
(B) Photosynthesis
(C) Decomposition
(D) Combustion

7. What is the key function of nitrogen-fixing bacteria in the nitrogen cycle?
(A) To break down dead organic matter and release nitrogen.
(B) To convert nitrates back into atmospheric nitrogen gas.
(C) To absorb nitrates from the soil for plant growth.
(D) To convert atmospheric nitrogen gas into ammonia.

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8. Match the concepts in List I with the descriptions in List II and select the correct option.
List I: (Concept)
P. Food Chain
Q. Food Web
R. Ecological Pyramid
S. Trophic Level
List II: (Description)
1. A graphical representation of the biomass

beneath another. They are often found adjacent to continental margins or island arcs, serving as critical sites for seismic activity and the recycling of the Earth's oceanic crust.

257. (D) Divergence of tectonic plates and creation of new crust
Mid-oceanic ridges are formed by the process of seafloor spreading at divergent plate boundaries. As tectonic plates pull apart, magma rises from the mantle to fill the gap, cooling to create new oceanic crust. This continuous volcanic activity results in an interconnected chain of underwater mountains, which is the most prominent topographical feature found within the global ocean basins.

258. (A) A Seamount has a pointed peak, while a Guyot has a flat top.
While both seamounts and guyots are underwater volcanic mountains, they differ significantly in their physical shape. A seamount is characterized by a pointed or rounded peak that does not reach the ocean surface. In contrast, a guyot, also known as a tablemount, features a flat top resulting from wave erosion that occurred when the feature once stood above sea level.

259. (C) Volcanic emergence, wave erosion, and subsequent subsidence
The formation of a guyot begins with a submarine volcanic eruption that eventually builds an island above sea level. Over time, powerful ocean waves erode the top of the island into a flat surface. Finally, the feature sinks or subsides below the ocean surface due to tectonic movement or cooling, resulting in a flat-topped, submerged mountain in the deep sea.

260. (A) Mid-Oceanic Ridges
A central rift valley is a characteristic geological feature located along the axis or crest of mid-oceanic ridges. This valley forms where the seafloor is actively pulling apart due to tectonic divergence. It represents a zone of intense volcanic and seismic activity where new crust is being generated, highlighting the dynamic nature of the Earth's mid-ocean ridge systems across the globe.

261. (D) The latitude and associated solar radiation
Latitude is the primary factor governing the horizontal distribution of ocean temperatures because it determines the intensity and duration of solar radiation. The equator receives the most direct sunlight, leading to warmer surface waters. As one moves toward the poles, the angle of solar radiation becomes more oblique, resulting in a gradual decrease in temperature across the surface of the world's oceans.

262. (B) By transferring heat from lower latitudes to higher latitudes
Ocean currents like the Gulf Stream function as a massive heat transport system for the planet. These warm currents move heated water from tropical regions toward higher latitudes, significantly warming the climates of coastal areas they pass. This process helps redistribute thermal energy across the globe, preventing extreme temperature differences between the equator and the poles and moderating regional climates effectively.

263. (C) A greater contact with extensive landmasses
Oceans in the Northern Hemisphere tend to be warmer than those in the Southern Hemisphere due to their extensive contact with large landmasses. Land heats up more rapidly than water, and this heat is transferred to the adjacent ocean waters. The relative lack of large landmasses in the Southern Hemisphere results in a lower overall heat gain for those southern oceanic regions.

264. (D) Winds blowing from the land towards the ocean
Upwelling occurs when prevailing winds blow from the land toward the ocean, pushing warm surface water away from the coastline. To replace this displaced water, cold and nutrient-rich water rises from the deeper layers of the ocean to the surface. This process is vital for marine ecosystems as it brings essential nutrients to the upper layers, supporting diverse and abundant marine life.

265. (A) A complex pattern resulting from multiple interacting factors.
The actual distribution of sea surface temperatures is not a simple latitudinal gradient but a complex mosaic. This pattern is shaped by the interaction of several factors, including solar radiation, the

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17. Which of the following is NOT a major greenhouse gas contributing to global warming?
(A) Carbon Dioxide (CO_2)
(B) Oxygen (O_2)
(C) Methane (CH_4)
(D) Nitrous Oxide (N_2O)

18. The "Brundtland Commission" is most famously associated with popularizing which concept?
(A) Sustainable Development
(B) Deep Ecology
(C) Ecological Pyramid
(D) Carbon Neutrality

19. The Kyoto Protocol was an international treaty that committed state parties to reduce:
(A) Ozone-depleting substances
(B) Transboundary water pollution
(C) Greenhouse gas emissions
(D) The use of persistent organic pollutants

20. Arrange the following international environmental initiatives in chronological order of their inception/adoption.
1. Paris Agreement
2. Kyoto Protocol
3. Agenda 21
4. Brundtland Commission Report ('Our Common Future')

(A) 4, 3, 2, 1
(B) 3, 4, 2, 1
(C) 4, 2, 3, 1
(D) 2, 4, 1, 3

21. Consider the following statements about environmental policies in India:
1. The Environment (Protection) Act was enacted in 1986.
2. The National Green Tribunal (NGT) was established to handle cases related to environmental protection.
3. The Forest (Conservation) Act primarily aims to increase agricultural land.
4. The Wildlife (Protection) Act was passed after the year 2000.

Which of the given statements are correct?
(A) 3 and 4
(B) 1 and 2
(C) 1 and 4
(D) 2 and 3

22. The 17 Sustainable Development Goals (SDGs) were adopted as a part of which larger framework?
(A) The Kyoto Protocol
(B) The 2030 Agenda for Sustainable Development
(C) The Paris Agreement
(D) The Brundtland Commission Report

23. The Paris Agreement aims to limit the global average temperature increase to well below what level, compared to pre-industrial levels?
(A) 3.0°C
(B) 1.0°C
(C) 2.5°C
(D) 2.0°C

24. What is the primary role of decomposers, such as bacteria and fungi, in an ecosystem?
(A) To break down dead organic matter and recycle nutrients.
(B) To convert solar energy into chemical energy.
(C) To consume primary producers.
(D) To form the base of the food web.

25. The geographic classification of ecosystems is primarily based on:
(A) The dominant animal species currently inhabiting the regional environment.
(B) The specific number of trophic levels present within the localized food web.
(C) The prevailing climatic and physical conditions characterizing a specific region.
(D) The overall level of human intervention and measurable environmental impact.

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26. Read the given statements and select the correct option.
Statement I : Environmental ethics is a branch of philosophy that studies the moral relationship of human beings to the environment.
Statement II : Anthropocentrism is an ethical viewpoint that places intrinsic value on all living organisms and ecosystems.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.

63. Which statement about the carbon cycle is INCORRECT?
(A) The burning of fossil fuels releases large amounts of stored carbon into the atmosphere.
(B) Oceans act as a major sink, absorbing atmospheric carbon dioxide.
(C) The carbon cycle operates independently of the oxygen and water cycles.
(D) Deforestation reduces the capacity of the biosphere to absorb carbon.

64. Match the SDG goals in List I with the objectives in List II and select the correct option.
List I: (SDG Goal)
P. SDG 6
Q. SDG 7
R. SDG 14
S. SDG 15
List II: (Objective)
1. Life Below Water
2. Affordable and Clean Energy
3. Life on Land
4. Clean Water and Sanitation
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-2, S-1
(C) P-4, Q-2, R-1, S-3
(D) P-3, Q-4, R-1, S-2

65. An example of a cause-and-effect relationship in environmental geography is:
(A) Cause: Sustainable farming practices; Effect: Increased soil erosion.
(B) Cause: Increased concentration of Chlorofluorocarbons (CFCs); Effect: Depletion of the stratospheric ozone layer.
(C) Cause: Afforestation; Effect: Increased Urban Heat Island effect.
(D) Cause: Use of renewable energy; Effect: Increased greenhouse gas emissions.

66. What is the fundamental difference between 'environmental ethics' and 'deep ecology'?
(A) Environmental ethics is anthropocentric, while deep ecology is ecocentric.
(B) Deep ecology is a branch of environmental ethics that advocates for more radical, non-anthropocentric viewpoints.
(C) There is no difference; the terms are synonymous.
(D) Environmental ethics focuses only on pollution, while deep ecology focuses only on biodiversity.

67. Which of the following is the most appropriate example of a detritus food chain?
(A) Grass → Grasshopper → Frog → Snake
(B) Phytoplankton → Zooplankton → Fish → Bird
(C) Algae → Mosquito larva → Dragonfly larva → Fish
(D) Dead leaves → Woodlouse → Blackbird

68. The legal principle of "Polluter Pays," often incorporated into national environmental laws, stipulates that:
(A) Those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.
(B) Consumers of a product are responsible for its environmental impact.
(C) The government should pay for all pollution cleanup.
(D) Pollution is an unavoidable externality of economic activity.

69. In a scenario where a lake receives excessive runoff of fertilizers, leading to an algal bloom, subsequent oxygen depletion, and a massive fish kill, what environmental disaster has occurred?
(A) Thermal pollution
(B) Acidification
(C) Eutrophication
(D) Sedimentation

70. Which of the following are key components of the Human Ecology framework?
1. Population characteristics (size, density)
2. Technology (tools, techniques)
3. Social Organization (kinship, governance)
4. Environment (physical, biological)
5. Abstract philosophical concepts with no real-world application
Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 3 and 5 only
(C) 1, 2, 3, and 4
(D) 2 and 4 only

71. All of the following are considered environmental hazards EXCEPT:

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37. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : The Paris Agreement uses a "bottom-up" approach where countries determine their own contributions to mitigate global warming.

Reason (R) : The previous "top-down" approach of the Kyoto Protocol, which set binding targets for developed nations only, faced challenges in achieving global participation and ratification.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

38. The primary objective of "Agenda 21," adopted at the Rio Earth Summit in 1992, was to provide a comprehensive plan of action for:
(A) Banning all greenhouse gas emissions immediately.
(B) Achieving sustainable development at local, national, and global levels.
(C) Exclusively protecting endangered species.
(D) Funding environmental research in developed countries only.

39. Sustainable Development Goal 13 (SDG 13) specifically urges for action on what issue?
(A) Quality Education
(B) Gender Equality
(C) Clean Water and Sanitation
(D) Climate Action

40. Which of the following is an example of an anthropogenic (human-caused) environmental hazard?
(A) An oil spill
(B) A volcanic eruption
(C) An earthquake
(D) A tsunami

41. Match the hazards in List I with the causes in List II and select the correct option.
List I: (Environmental Hazard)
P. Global Warming
Q. Urban Heat Island
R. Water Pollution (Eutrophication)
S. Land Degradation
List II: (Primary Cause/Component)
1. Excess nutrients (Nitrogen, Phosphorus)
2. Increased greenhouse gas concentrations
3. Soil erosion and loss of fertility
4. Altered land surfaces and waste heat
Codes:
(A) P-1, Q-3, R-4, S-2
(B) P-2, Q-4, R-1, S-3
(C) P-2, Q-1, R-3, S-4
(D) P-4, Q-2, R-1, S-3

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42. The term "Human Ecology" was coined to emphasize the study of human communities as:
(A) Distinct biological units separate from their environment.
(B) Part of a larger ecological system with complex interactions.
(C) Social structures independent of ecological factors.
(D) Primarily economic systems driven by resource extraction.

43. Which of the following best represents the concept of a "food chain"?
(A) A complex network of all feeding relationships in a habitat.
(B) The total weight of all organisms at a specific trophic level.
(C) Grass → Zebra → Lion → Vulture
(D) The process of nutrient recycling by bacteria and fungi.

44. Which of these is a density-independent factor that could impact a population within an ecosystem?
(A) Competition for food
(B) Spread of disease
(C) Predation
(D) A wildfire

45. The 'pyramid of energy' in an ecosystem is always upright because:
(A) The number of organisms always decreases at higher trophic levels.
(B) The biomass of organisms always decreases at higher trophic levels.
(C) There is a progressive loss of energy at each successive trophic level.
(D) Producers are always larger in size than consumers.

but differentiated responsibilities".
3. It set binding emission reduction targets for all signatory nations, including developing countries.
4. The United States ratified the protocol and fully participated in its mechanisms.
5. It established flexible mechanisms like the Clean Development Mechanism (CDM).

Which of the above statements are correct?
(A) 1, 2, and 5
(B) 1, 3, and 4
(C) 2, 4, and 5
(D) 3 and 4 only

81. "A non-human-centered ethical perspective that ascribes intrinsic value to the entire ecosphere and its components" is the core tenet of:
(A) Anthropocentrism
(B) Ecocentrism
(C) Utilitarianism
(D) Economic rationalism

82. Which of the following represents a correct pair of an environmental agreement and its primary focus?
(A) Agenda 21 - Framework for sustainable development
(B) Paris Agreement - Phasing out ozone-depleting substances
(C) Kyoto Protocol - Regulation of international waste transport
(D) Brundtland Commission - Setting binding CO_2 emission targets

83. In the context of Human Ecology, technology is viewed as:
(A) An exclusively destructive force on the environment.
(B) A factor completely independent of social organization and values.
(C) A solution to all environmental problems without any drawbacks.
(D) A mediating factor that shapes the way humans interact with and modify their environment.

84. The process where chemicals and pollutants become more concentrated at each successive trophic level in a food web is called:
(A) Bioaccumulation
(B) Biomagnification
(C) Biodegradation
(D) Bioremediation

85. Which of the following is a key function of an ecosystem?
(A) Maintenance of a static, unchanging environment.
(B) The complete separation of living and non-living components.
(C) Nutrient cycling and energy flow.
(D) The elimination of all competition between species.

86. Match the terms in List I with the definitions or examples in List II and select the correct option.
List I: (Term)
P. Abiotic Component
Q. Biotic Component
R. Producer
S. Saprotroph
List II: (Definition/Example)
1. A plant that performs photosynthesis
2. Soil, water, and sunlight
3. A fungus that decomposes dead wood
4. An animal that eats other organisms
Codes:
(A) P-1, Q-4, R-2, S-3
(B) P-2, Q-4, R-1, S-3
(C) P-2, Q-1, R-4, S-3
(D) P-3, Q-2, R-1, S-4

87. Read the given statements and select the correct option.
Statement I : Land degradation is a process that only affects arid and semi-arid regions.
Statement II : Deforestation, improper agricultural practices, and industrial pollution can all contribute to land degradation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is incorrect, but Statement II is correct.
(D) Statement I is correct, but Statement II is correct.

88. If a city government decides to paint roofs white and plant more trees, it is primarily attempting to mitigate which environmental problem?
(A) Water pollution

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theirs.

55. Under the Kyoto Protocol, the "Annex I" countries were primarily:
(A) Industrialized nations with binding emission reduction targets.
(B) Developing nations with no binding targets.
(C) The least developed countries eligible for special funds.
(D) Countries with economies in transition.

56. The concept of "Common But Differentiated Responsibilities" (CBDR), central to international climate negotiations, implies that:
(A) All countries must take identical actions to combat climate change.
(B) Developed countries should bear greater responsibility due to their historical contribution to the problem.
(C) Only developing countries are responsible for historical emissions.
(D) Environmental responsibility is solely determined by a country's geographic size.

57. A community is considering two development plans. Plan A involves clearing a forest for a shopping mall. Plan B involves creating a mixed-use development with green roofs, permeable pavements, and a protected park area.
From a 'Human Ecology' perspective, which statement is most accurate?
(A) Plan A is better as it maximizes immediate economic gain.
(B) Plan B is better as it attempts to integrate the human-built environment with natural ecological functions.
(C) Both plans are equally detrimental as they involve construction.
(D) The choice depends solely on the number of jobs created.

58. Consider the following statements about the functions of an ecosystem:
1. Energy flows in a single direction, from producers to consumers.
2. Nutrients are cycled and reused within the ecosystem.
3. Decomposers are not essential for the ecosystem's functioning.
4. The ultimate source of energy for most ecosystems is geothermal heat.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2, and 4
(D) 2 and 3 only

59. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : A food web is considered a more stable system than a simple food chain.
Reason (R) : In a food web, organisms have multiple alternative food sources, which provides a buffer against the population decline of a single species.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

60. The "Nationally Determined Contributions" (NDCs) are a central feature of which international agreement?
(A) The Kyoto Protocol
(B) Agenda 21
(C) The Brundtland Commission Report
(D) The Paris Agreement

61. Which of the following is a primary objective of India's National Environmental Policy, 2006?
(A) To nationalize all private industries causing pollution.
(B) To conserve environmental resources while ensuring livelihood security.
(C) To relocate all urban populations to rural areas.
(D) To prohibit all forms of industrial development.

62. The geographic classification of ecosystems can include all of the following EXCEPT:
(A) Terrestrial ecosystems (forests, grasslands, deserts).
(B) Aquatic ecosystems (ponds, oceans, rivers).
(C) Artificial ecosystems (aquariums, croplands).
(D) Trophic ecosystems (defined by energy levels).

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46. The geo-chemical cycle of which element is most closely associated with rocks and sediments, having no major atmospheric component?
(A) Carbon
(B) Phosphorus
(C) Nitrogen
(D) Oxygen

47. Read the given statements and select the correct option.
Statement I : Deep Ecology argues for an ecocentric worldview, where the well-being of the entire ecosphere is paramount.
Statement II : Environmental ethics is solely concerned with the economic valuation of natural resources.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

48. A significant cause of the Urban Heat Island effect is the lower albedo of urban surfaces. What does 'lower albedo' mean in this context?
(A) Urban surfaces reflect more solar radiation.
(B) Urban surfaces absorb more solar radiation.
(C) Urban surfaces retain more moisture.
(D) Urban surfaces have better air circulation.

49. Acid rain is a form of atmospheric pollution primarily caused by the atmospheric reaction of water with which two pollutants?
(A) Carbon dioxide and Methane
(B) Ozone and Particulate Matter
(C) Sulfur dioxide and Nitrogen oxides
(D) Carbon monoxide and Volatile Organic Compounds

50. Consider the following international agreements:
1. Montreal Protocol
2. Kyoto Protocol
3. Paris Agreement
4. Basel Convention
Which of these are primarily focused on addressing climate change by targeting greenhouse gas emissions?
(A) 1 and 4
(B) 2 and 3
(C) 1 and 3
(D) 2 and 4

51. Arrange the following trophic levels in the correct order of energy flow in a typical ecosystem, starting from the source.
1. Tertiary Consumers
2. Primary Producers
3. Primary Consumers
4. Secondary Consumers
(A) 2, 3, 4, 1
(B) 1, 4, 3, 2
(C) 2, 4, 3, 1
(D) 3, 2, 4, 1

52. What does the term 'bioaccumulation' refer to in the context of water pollution?
(A) The natural enrichment of a water body with nutrients.
(B) The process of water purification using biological agents.
(C) The increase in biodiversity following a pollution event.
(D) The increase in the concentration of a pollutant in an organism over time.

53. Which of the following is a key principle of environmental ethics?
(A) The belief that natural resources are infinite.
(B) The principle that economic growth should always take precedence over environmental protection.
(C) The idea that humans have a moral responsibility towards the environment.
(D) The view that only sentient animals deserve moral consideration.

54. The Brundtland Commission's report, "Our Common Future," defined sustainable development as development that:
(A) Prioritizes the maximization of short-term economic output and industrial gain.
(B) Places environmental conservation above all human resource and infrastructure needs.
(C) Focuses on the rapid industrialization of developing nations to match global standards.
(D) Meets present needs without compromising the ability of future generations to meet

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(A) Global Warming
(B) Water Pollution
(C) Land Degradation
(D) Sustainable agriculture

72. The pyramid of biomass in a pond ecosystem, where the mass of phytoplankton (producers) at any given time may be less than the mass of zooplankton (primary consumers), is typically:
(A) Upright
(B) Inverted
(C) Spindle-shaped
(D) Linear

73. Read the given statements and select the correct option.
Statement I : The Paris Agreement requires all signatory countries, both developed and developing, to submit Nationally Determined Contributions (NDCs).
Statement II : The Kyoto Protocol imposed emission reduction targets only on developing countries.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

74. The main role of the oxygen cycle is to:
(A) Regulate the Earth's climate.
(B) Convert nitrogen into a usable form for plants.
(C) Create fossil fuels over geological time.
(D) Facilitate the movement of oxygen through the atmosphere, biosphere, and lithosphere.

75. Arrange the following steps of the nitrogen cycle in a logical sequence, starting with atmospheric nitrogen.
1. Nitrification (by bacteria)
2. Denitrification (by bacteria)
3. Nitrogen fixation (by bacteria or lightning)
4. Ammonification (by decomposers)

(A) 3, 4, 1, 2
(B) 2, 1, 4, 3
(C) 3, 1, 4, 2
(D) 1, 2, 3, 4

76. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The Urban Heat Island effect is often more pronounced at night than during the day.
Reason (R) : Urban materials like concrete and asphalt have high thermal inertia, meaning they slowly release the solar energy absorbed during the day, keeping the city warmer at night.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

77. An environmental impact assessment (EIA) is a process within a national legal framework designed to:
(A) Punish industries that have already caused pollution.
(B) Provide government subsidies for green technologies.
(C) Market environmentally friendly products to consumers.
(D) Evaluate the likely environmental impacts of a proposed project before a decision is made to proceed.

78. Which of the following is NOT a direct impact of global warming?
(A) Sea level rise
(B) Strengthening of the ozone layer
(C) Increased frequency of extreme weather events
(D) Melting of glaciers and ice sheets

79. The concept of "trophic levels" is fundamental to understanding:
(A) The geographic distribution of species.
(B) The process of soil formation.
(C) The flow of energy and matter through an ecosystem.
(D) The causes of urban heat islands.

80. Consider the following statements regarding the Kyoto Protocol:
1. It was adopted in Kyoto, Japan, in 1997.
2. It was based on the principle of "common

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(A) The genetic makeup of the human population.
(B) The relationship between social organization, technology, and the environment.
(C) The Earth's climate system.
(D) The basic principles of energy flow.

98. A company is found to be discharging untreated industrial effluent into a river, causing harm to aquatic life and making the water unfit for human use. Under a national legal framework, this action would be classified as:
(A) A violation of water pollution regulations.
(B) A positive environmental practice.
(C) Land degradation.
(D) A contribution to the Urban Heat Island effect.

99. Which of the following best describes the goal of Deep Ecology?
(A) To find technological solutions for every environmental problem.
(B) To manage natural resources for maximum human economic benefit.
(C) To foster a fundamental shift in consciousness from anthropocentrism to ecocentrism.
(D) To focus exclusively on the impacts of pollution on human health.

100. Consider the following elements of environmental policy:
1. The establishment of national parks and wildlife sanctuaries.
2. The requirement for Environmental Impact Assessments (EIAs) for new projects.
3. The implementation of emission standards for vehicles and industries.
4. The promotion of international cooperation on transboundary pollution.

Which of these fall under the purview of a national government's environmental legal framework?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2, and 3 only
(D) 1, 2, 3, and 4

101. Arrange the events in the history of international environmental policy in the correct chronological sequence.
1. Adoption of Agenda 21 at the Rio Earth Summit.
2. Entry into force of the Paris Agreement.
3. Publication of the Brundtland Commission's report "Our Common Future".
4. Adoption of the Kyoto Protocol.

(A) 3, 1, 4, 2
(B) 1, 3, 4, 2
(C) 3, 4, 1, 2
(D) 1, 4, 3, 2

102. An organism that obtains its energy by feeding on the dead organic matter of other organisms is known as a:
(A) Producer
(B) Detritivore or Decomposer
(C) Primary consumer
(D) Secondary consumer

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103. Which statement accurately distinguishes a food web from a food chain?
(A) A food chain shows multiple interconnected feeding relationships, while a food web is linear.
(B) Only food chains include producers and decomposers.
(C) A food web only tracks the flow of energy, whereas a food chain tracks nutrients.
(D) A food web provides a more complex and realistic model of energy flow in an ecosystem.

104. The primary goal of the UNFCCC (United Nations Framework Convention on Climate Change), under which both the Kyoto Protocol and Paris Agreement were negotiated, is to:
(A) Stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
(B) Ban the use of all fossil fuels by the year 2030.
(C) Fund space exploration to find alternative habitable planets.
(D) Regulate the international trade of endangered species.

(B) The Urban Heat Island effect
(C) Land degradation
(D) Acid rain

89. Which of these is NOT one of the 17 Sustainable Development Goals (SDGs)?
(A) No Poverty (SDG 1)
(B) Zero Hunger (SDG 2)
(C) Space Exploration
(D) Decent Work and Economic Growth (SDG 8)

90. The breakdown of rock and organic matter into simpler inorganic substances is a crucial part of which ecosystem process?
(A) Energy flow
(B) Photosynthesis
(C) Trophic level structuring
(D) Geo-chemical cycling

91. Which of the following statements about the Paris Agreement is correct?
(A) It legally binds countries to achieve their self-determined emission reduction targets (NDCs).
(B) It applies only to developed countries, similar to the Kyoto Protocol.
(C) It sets a global goal but relies on voluntary, nationally determined contributions to achieve it.
(D) It was designed to be replaced by the Kyoto Protocol in 2020.

92. Consider the following statements:
1. An ecosystem consists only of the living organisms in an area.
2. Human ecology studies the one-way impact of humans on the environment.
3. The geographic classification of ecosystems is based on climate and physical features.
4. Artificial ecosystems like agricultural fields are not studied in ecology.

Which of the above statement(s) is/are correct?
(A) 3 only
(B) 1 and 2
(C) 3 and 4
(D) 1, 2, and 4

93. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The adoption of the Sustainable Development Goals (SDGs) marked a shift towards a more integrated and universal agenda compared to their predecessors, the Millennium Development Goals (MDGs).
Reason (R) : The SDGs apply to all countries, rich and poor, and interlink economic, social, and environmental dimensions, whereas the MDGs were more focused on developing countries and specific social targets.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

94. The concept of an "ecological pyramid" was developed to illustrate the relationships between which aspects of an ecosystem?
(A) The genetic diversity within a single species.
(B) The geographical range of different ecosystems.
(C) The historical evolution of species over time.
(D) Numbers, biomass, and energy at successive trophic levels.

95. In the nitrogen cycle, the process by which decomposers break down dead organic matter and animal waste to release nitrogen as ammonia is called:
(A) Ammonification
(B) Nitrogen Fixation
(C) Nitrification
(D) Denitrification

96. Which of these international efforts came first?
(A) The Paris Agreement
(B) The Brundtland Commission report 'Our Common Future'
(C) The Kyoto Protocol
(D) The adoption of the Sustainable Development Goals

97. From a Human Ecology perspective, the transition from a hunter-gatherer society to an agricultural society represents a fundamental shift in:

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(D) Statement I is incorrect, but Statement II is correct.

27. Read the following scenario and answer the question.
A study observes a city where extensive use of dark-colored paving materials and a high density of buildings has led to significantly higher nighttime temperatures compared to the nearby countryside. This phenomenon is an application of which concept?
(A) Global Warming
(B) Land Degradation
(C) Atmospheric Pollution
(D) Urban Heat Island effect

28. Which of the following is an incorrect pair?
(A) Decomposer - Tertiary Consumer
(B) Autotroph - Producer
(C) Herbivore - Primary Consumer
(D) Carnivore - Secondary Consumer

29. The concept of 'Human Ecology' emphasizes that humans are:
(A) Separate from and superior to their environment.
(B) Solely shaped by their genetic makeup, independent of the environment.
(C) An integral part of ecosystems, influencing and being influenced by them.
(D) Only capable of negatively impacting their environment.

30. Which cycle involves the processes of evaporation, condensation, precipitation, and transpiration?
(A) Hydrological (Water) Cycle
(B) Nitrogen Cycle
(C) Oxygen Cycle
(D) Carbon Cycle

31. An ecological pyramid of numbers might be inverted in which of the following scenarios?
(A) A grassland with numerous insect populations feeding upon plant species.
(B) A pond ecosystem with phytoplankton serving as the primary producers.
(C) A desert ecosystem characterized by sparse vegetation and low density.
(D) A forest ecosystem where one large tree supports thousands of insects.

32. The process of 'denitrification' in the nitrogen cycle is the conversion of:
(A) Atmospheric nitrogen to ammonia.
(B) Nitrates to atmospheric nitrogen.
(C) Ammonia to nitrites.
(D) Organic nitrogen to ammonium.

33. Which of the following statements correctly describes a function of the Oxygen cycle?
(A) Oxygen is primarily produced by volcanic eruptions.
(B) Photosynthesis releases oxygen, while respiration consumes it.
(C) The main reservoir of Earth's oxygen is in the atmosphere as O_2 gas.
(D) Oxygen is not a component of water (H_2O).

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34. A farmer notices that soil fertility in one of his fields has drastically reduced due to the removal of topsoil by wind and water. This is an example of:
(A) Land Degradation
(B) Water Pollution
(C) Urban Heat Island
(D) Atmospheric Pollution

35. The legal framework for environmental protection in India, such as the Environment (Protection) Act, 1986, was significantly strengthened in response to which event?
(A) The Chipko Movement
(B) The establishment of the first national park
(C) The Bhopal Gas Tragedy
(D) The Narmada Bachao Andolan

36. Consider the following aspects of environmental management:
1. Setting emission standards for industries.
2. Conserving biodiversity in protected areas.
3. Promoting the use of renewable energy sources.
4. Assessing the environmental impact of new projects.
5. Remediating contaminated sites.

Which of these are typically covered under a nation's Environmental Policy and Legal Framework?
(A) 1, 2, and 3 only
(B) 1 and 4 only
(C) 3, 4, and 5 only
(D) 1, 2, 3, 4, and 5

105. Read the given statements and select the correct option.

Statement I : The energy flow in an ecosystem is cyclic, meaning energy is constantly reused by the producers.

Statement II : The nutrient flow (geo-chemical cycles) in an ecosystem is largely cyclic, with elements being reused multiple times.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is incorrect, but Statement II is correct.
(D) Statement I is correct, but Statement II is incorrect.

106. Match the pollutants in List I with the associated environmental hazards in List II and select the correct option.

List I: (Pollutant)
P. Carbon Dioxide (CO_2)
Q. Sulfur Dioxide (SO_2)
R. Chlorofluorocarbons (CFCs)
S. Nutrients (Nitrates/Phosphates)

List II: (Associated Environmental Hazard)
1. Acid Rain
2. Ozone Layer Depletion
3. Global Warming
4. Water Pollution (Eutrophication)

Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-3, Q-2, R-1, S-4
(C) P-2, Q-1, R-3, S-4
(D) P-1, Q-3, R-4, S-2

107. The replacement of natural ground cover with impermeable surfaces like asphalt and concrete is a major contributing factor to which two environmental issues?

(A) Ozone depletion and land degradation.
(B) Global warming and desertification.
(C) Acid rain and soil salinization.
(D) Urban Heat Island effect and increased surface runoff leading to water pollution.

108. Which of the following represents an incorrect association in the context of ecosystem components?

(A) Geographic Classification - Based on climate and landforms like tundra, desert, rainforest.
(B) Trophic Levels - Defined by the species' geographic range.
(C) Human Ecology - Study of humans as a component of their ecosystem.
(D) Ecosystem Function - Includes energy flow and nutrient cycling.

109. If a pesticide like DDT is introduced into a lake's food chain, where would you expect to find the highest concentration due to biomagnification?

(A) In the water itself.
(B) In the phytoplankton (producers).
(C) In large predatory birds that eat the fish (tertiary or quaternary consumers).
(D) In small fish (primary consumers).

110. Consider the following statements about the Brundtland Commission:

1. Its formal name was the World Commission on Environment and Development.
2. It was established by the United Nations in the 1980s.
3. Its report, "Our Common Future," introduced the concept of deep ecology.
4. It concluded that economic development and environmental protection are fundamentally incompatible.

Which of the above statement(s) is/are correct?

(A) 3 and 4
(B) 1 and 2
(C) 1, 2 and 4
(D) 2 and 3

111. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.

Assertion (A) : The nitrogen cycle is crucial for life as nitrogen is a key component of proteins and nucleic acids.

Reason (R) : Most organisms can directly use the abundant nitrogen gas (N_2) in the atmosphere.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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(B) Dry weight of all organisms at each trophic level.
(C) Rate of energy flow through each trophic level.
(D) Geographic area occupied by each trophic level.

167. Which of the following is a primary human impact on the nitrogen cycle?
(A) The use of nitrogen-fixing cover crops in organic farming.
(B) The natural process of lightning fixing atmospheric nitrogen.
(C) The decomposition of organic matter by soil bacteria.
(D) The large-scale production and use of nitrogenous fertilizers in agriculture.

168. The "10 percent law" of energy transfer in ecosystems states that:
(A) Only 10% of the energy from a lower trophic level is transferred to the next higher level.
(B) 10% of all species in an ecosystem are producers.
(C) An ecosystem can only support a maximum of 10 trophic levels.
(D) 10% of the sun's energy is captured by producers.

169. Consider the following statements about Environmental Hazards:
1. Global Warming is primarily caused by the depletion of the stratospheric ozone layer.
2. Urban Heat Islands are characterized by cooler temperatures in cities compared to rural areas.
3. Atmospheric pollution includes pollutants like particulate matter (PM2.5) and sulfur dioxide (SO_2).
4. Land degradation refers to the deterioration of land quality, reducing its productive capacity.

Which of the statement(s) given above are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1, 3 and 4
(D) 2 and 3

170. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The Kyoto Protocol established a "cap and trade" system for greenhouse gas emissions.
Reason (R) : This system allowed countries with emission reduction commitments to trade emission permits, creating a market-based incentive to reduce pollution.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

171. The Sustainable Development Goals (SDGs) are a set of universal goals that:
(A) Apply only to the least developed countries.
(B) Focus exclusively on environmental protection.
(C) Were adopted by the United Nations to be achieved by 2030.
(D) Replaced the Paris Agreement on climate change.

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172. The study of the interrelationships between human communities and their environments, emphasizing adaptation, is the focus of:
(A) Physical Geography
(B) Biogeography
(C) Geomorphology
(D) Human Ecology

173. Which of the following is a correct representation of a food chain?
(A) Sun → Grass → Rabbit → Fox
(B) Fox → Rabbit → Grass
(C) Grass → Rabbit → Fox
(D) Rabbit → Fox → Grass

174. The main objective of the legal framework surrounding a country's environmental policy is to:
(A) Promote rapid, unregulated industrialization.
(B) Document historical climate data.
(C) Subsidize polluting industries.
(D) Codify principles, procedures, and standards to protect the environment.

everywhere.
(B) Access to affordable, reliable, sustainable and modern energy for all.
(C) The conservation and sustainable use of the oceans, seas and marine resources.
(D) The promotion of sustained, inclusive and sustainable economic growth.

122. Read the given statements and select the correct option.
Statement I : The Urban Heat Island effect can lead to increased energy consumption for cooling in cities.
Statement II : The materials used in urban construction, like asphalt and concrete, tend to absorb and retain more heat than natural vegetation.
(A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

123. The geographic classification of a large-scale ecosystem, primarily determined by climate, is known as a:
(A) Niche
(B) Population
(C) Community
(D) Biome

124. The relationship between a fungus and an alga in a lichen, where both benefit, is an example of a biotic interaction within an ecosystem. This specific interaction is known as:
(A) Parasitism
(B) Commensalism
(C) Competition
(D) Mutualism

125. Which of the following is a direct consequence of atmospheric pollution?
(A) Improved soil fertility
(B) Reduced incidence of respiratory illnesses
(C) Formation of acid rain and smog
(D) Increased agricultural productivity

126. Arrange the following international agreements/ reports in chronological order from earliest to latest.
1. Paris Agreement
2. Agenda 21
3. Kyoto Protocol
(A) 1, 2, 3
(B) 2, 3, 1
(C) 3, 2, 1
(D) 2, 1, 3

127. Which of the following pairs is correctly matched?
(A) Human Ecology - Focuses only on the physical environment, ignoring social aspects.
(B) Deep Ecology - Advocates for the shallow management of pollution.
(C) Kyoto Protocol - Based on voluntary, non-binding targets for all nations.
(D) Brundtland Commission - Popularized the term 'Sustainable Development'.

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128. From an ecosystem perspective, what is the primary role of herbivorous animals?
(A) To act as producers by creating their own food.
(B) To transfer energy from producers to secondary consumers.
(C) To decompose dead organic matter.
(D) To regulate the population of top predators.

129. The concept of an ecological pyramid of energy is based on which fundamental law of thermodynamics?
(A) The law of conservation of energy (First Law).
(B) The law that absolute zero is unattainable (Third Law).
(C) The law of increasing entropy, which dictates energy loss as heat in transfers (Second Law).
(D) The zeroth law of thermodynamics concerning thermal equilibrium.

130. A key feature of a geo-chemical cycle, such as the carbon or nitrogen cycle, is that:
(A) It involves only biological processes.
(B) It describes a one-way flow of elements that are eventually lost from the planet.
(C) It is a purely man-made phenomenon.

147. A large industrial city reports high levels of sulfur dioxide (SO_2) and nitrogen oxides (NOx) in its atmosphere. This is likely to lead to which specific environmental hazard in the region?
(A) Eutrophication of local lakes
(B) Ozone layer depletion
(C) Increased soil salinity
(D) Acid rain

148. Which of the following is an example of a policy measure that falls under a national environmental legal framework?
(A) A law mandating catalytic converters in automobiles to reduce emissions.
(B) A company's internal decision to use recycled paper.
(C) A neighborhood's voluntary cleanup drive.
(D) An international treaty signed but not ratified by the country.

149. The main criticism of a simple 'pyramid of numbers' is that it:
(A) Does not account for the flow of energy.
(B) Is always inverted.
(C) Does not take into account the size of the organisms at each level.
(D) Fails to represent the decomposers.

150. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : The Paris Agreement was hailed as a landmark for its universal participation, including commitments from both developed and developing countries.
Reason (R) : Unlike the Kyoto Protocol, the Paris Agreement shifted away from imposing pre-determined, legally binding targets and instead adopted a system of voluntary Nationally Determined Contributions (NDCs).
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

151. An ecosystem is geographically classified as 'pelagic'. This ecosystem belongs to which major category?
(A) Terrestrial Forest Ecosystem
(B) Aquatic Marine Ecosystem
(C) Terrestrial Desert Ecosystem
(D) Artificial Urban Ecosystem

152. In a food chain "Grass → Deer → Tiger", the tiger occupies which trophic level?
(A) T3 (Secondary Consumer)
(B) T1 (Producer)
(C) T2 (Primary Consumer)
(D) T4 (Tertiary Consumer)

153. Consider the following statements:
1. Energy flows unidirectionally through an ecosystem.
2. Nutrients are cycled within an ecosystem.
3. The pyramid of energy can be inverted.
4. A food web consists of many interconnected food chains.

Which of the above statements are correct?
(A) 1, 2, and 4
(B) 1 and 3 only
(C) 2, 3, and 4
(D) All of the above

154. Which of the following best describes the process of combustion in the carbon cycle?
(A) The uptake of CO_2 from the atmosphere by plants.
(B) The breakdown of organic matter by bacteria, releasing CO_2.
(C) The dissolution of atmospheric CO_2 into the ocean.
(D) The rapid oxidation of organic materials, releasing large amounts of CO_2 into the atmosphere.

155. The conversion of nitrates (NO_3^-) back to gaseous nitrogen (N_2) by certain bacteria is known as:
(A) Nitrification
(B) Nitrogen fixation
(C) Denitrification
(D) Ammonification

156. An environmental ethic which extends moral standing to all living things is termed:
(A) Anthropocentrism
(B) Biocentrism
(C) Technocentrism
(D) Androcentrism

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4. Binding targets for Annex I countries

Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-3, Q-1, R-2, S-4

139. A major distinction between shallow environmentalism and deep ecology is that shallow environmentalism:
(A) Views nature as having intrinsic value independent of humans.
(B) Seeks radical changes in political and social structures.
(C) Typically adopts an anthropocentric perspective, focusing on environmental problems as they affect humans.
(D) Rejects the use of technology to solve environmental problems.

140. Which process is primarily responsible for returning oxygen to the atmosphere?
(A) Photosynthesis by plants and algae
(B) Respiration by animals
(C) Decomposition of organic matter
(D) Combustion of fossil fuels

141. The term "Ecosystem" encompasses:
(A) Only the plant and animal life in a region.
(B) Only the non-living factors like climate, soil, and water.
(C) The human population and its economic activities exclusively.
(D) Both the biotic (living) and abiotic (non-living) components and their interactions.

142. A person who believes that all forms of life have an inherent right to exist, irrespective of their usefulness to humans, is adhering to the principles of:
(A) Economic pragmatism
(B) Biocentrism or Ecocentrism
(C) Anthropocentrism
(D) Utilitarianism

143. Read the given statements and select the correct option.

Statement I : Global warming is caused by an increase in the concentration of greenhouse gases like CO_2, which trap outgoing infrared radiation.

Statement II : The primary source of the recent increase in atmospheric CO_2 is volcanic activity.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

144. In the study of Human Ecology, social organization, technology, and population are seen as key variables that:
(A) Have no influence on the environment.
(B) Determine how a human group adapts to and modifies its environment.
(C) Are solely determined by the physical environment.
(D) Are relevant only in pre-industrial societies.

145. Consider the following statements regarding ecosystem functions:
1. Energy is created by producers at the first trophic level.
2. A food web represents a single pathway of energy.
3. Geo-chemical cycles involve the movement of matter between living and non-living parts of the ecosystem.
4. Ecological pyramids can represent numbers, biomass, or energy.
5. The 10% rule suggests that 90% of energy is created at each trophic level transfer.

Which of the above statement(s) is/are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1, 3 and 5
(D) 2 and 5

146. What is the central aim of Sustainable Development Goal 15 (Life on Land)?
(A) To promote peaceful and inclusive societies.
(B) To protect, restore and promote sustainable use of terrestrial ecosystems and halt biodiversity loss.
(C) To ensure access to affordable and clean energy.
(D) To ensure availability and sustainable management of water and sanitation for all.

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(D) It involves the movement and transformation of elements through biotic and abiotic components of the Earth.

131. Consider the following statements related to Human Interaction and Impacts:
1. Deep ecology promotes an anthropocentric worldview.
2. The Urban Heat Island effect is an example of localized climate modification by human activities.
3. Land degradation is exclusively caused by natural phenomena like wind erosion.
4. Eutrophication is a form of water pollution caused by nutrient enrichment.

Which of the above statements are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 2 and 4
(D) 2 and 3

132. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : International environmental agreements are crucial for addressing transboundary problems like global warming.
Reason (R) : The actions of one country regarding greenhouse gas emissions can affect the climate of the entire planet, necessitating cooperative action.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

133. The National Green Tribunal (NGT) in India is a:
(A) Non-governmental organization focused on environmental activism.
(B) Governmental ministry responsible for formulating environmental policy.
(C) Specialized judicial body for the effective and expeditious disposal of cases relating to environmental protection.
(D) Research institute studying climate change.

134. Which of the following best describes the 'functions' of an ecosystem?
(A) The physical structure and components of the ecosystem.
(B) The list of species present in the ecosystem.
(C) The geographic boundaries of the ecosystem.
(D) The collective processes like energy flow and nutrient cycling that characterize the system.

135. In an ecological context, what is a food web?
(A) A complex network of interconnected food chains showing multiple feeding relationships.
(B) A single, linear pathway of energy transfer.
(C) The total weight of all living matter in an ecosystem.
(D) A graphical representation of the number of individuals at each trophic level.

136. Which one of the following is NOT a consequence of land degradation?
(A) Reduced agricultural productivity.
(B) Increased soil biodiversity and fertility.
(C) Desertification in arid and semi-arid areas.
(D) Increased risk of flooding and landslides.

137. The '2030 Agenda for Sustainable Development', which includes the SDGs, was a successor to which previous international framework?
(A) The Kyoto Protocol
(B) The Millennium Development Goals (MDGs)
(C) The Paris Agreement
(D) The Brundtland Report

138. Match the international initiatives in List I with the key features in List II and select the correct option.
List I: (International Initiative)
P. Kyoto Protocol
Q. Paris Agreement
R. Agenda 21
S. Brundtland Commission
List II: (Key Feature)
1. Nationally Determined Contributions (NDCs)
2. Comprehensive action plan for Sustainable Development
3. Defined and popularized 'Sustainable Development'

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157. Read the given statements and select the correct option.

Statement I : The Urban Heat Island effect can increase the concentration of ground-level ozone.

Statement II : The higher temperatures in a UHI can accelerate the chemical reactions that form smog and ozone.

(A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are correct, but Statement II is not the correct explanation of Statement I.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

158. The loss of topsoil due to wind or water, leading to a decline in soil fertility, is a form of:
(A) Waterlogging
(B) Eutrophication
(C) Atmospheric deposition
(D) Soil erosion

159. The Environment (Protection) Act, 1986, is an important piece of legislation in India that provides a framework for:
(A) The protection and improvement of the environment.
(B) The promotion of industrial growth at any cost.
(C) The regulation of international trade only.
(D) The establishment of political parties.

160. The Brundtland Commission report is officially titled:
(A) Agenda 21
(B) Our Common Future
(C) The Limits to Growth
(D) An Inconvenient Truth

161. Which of the following is a key commitment under the Paris Agreement?
(A) For developed countries to provide a fixed amount of 1 trillion USD annually to developing nations.
(B) For each country to formulate and communicate its Nationally Determined Contributions (NDCs).
(C) A legally binding global cap on emissions to be achieved by 2025.
(D) The complete phase-out of all fossil fuels by 2030.

162. Arrange the following components of a typical food chain in ascending order of trophic level.
1. Hawk
2. Grass
3. Snake
4. Grasshopper

(A) 2, 4, 3, 1
(B) 2, 3, 4, 1
(C) 1, 3, 4, 2
(D) 4, 2, 3, 1

163. A cause-effect relationship in environmental science could be: Cause: Deforestation on a large scale; Effect:
(A) Increased carbon sequestration
(B) Increased habitat for forest-dwelling species
(C) Increased soil erosion and loss of biodiversity
(D) Improved local air quality

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164. What is the fundamental unit of study in ecology, comprising both biotic and abiotic components?
(A) A population
(B) A community
(C) A biome
(D) An ecosystem

165. Match the concepts in List I with the associated ideas in List II and select the correct option.

List I: (Concept)
P. Human Ecology
Q. Trophic Level
R. Deep Ecology
S. Agenda 21

List II: (Associated Idea)
1. Ecocentrism and intrinsic value of nature
2. Study of human adaptation to environment
3. Blueprint for sustainable development
4. Position in a food chain

Codes:
(A) P-1, Q-3, R-2, S-4
(B) P-2, Q-4, R-1, S-3
(C) P-4, Q-2, R-3, S-1
(D) P-2, Q-1, R-4, S-3

166. A pyramid of biomass shows the total:
(A) Number of individuals at each trophic level.

112. "Salinization," a process that diminishes soil quality and crop productivity, is a form of:
(A) Atmospheric Pollution
(B) Land Degradation
(C) Urban Heat Island
(D) Water Pollution

113. The adoption of Agenda 21 at the 1992 Earth Summit in Rio de Janeiro was a significant step because it:
(A) established a legally binding treaty to cut CO_2 emissions.
(B) created the Sustainable Development Goals (SDGs).
(C) provided a non-binding action plan for sustainable development.
(D) was the first international meeting to discuss environmental issues.

114. A key difference between the Paris Agreement and the Kyoto Protocol is that the Paris Agreement:
(A) only includes commitments from developed nations.
(B) sets uniform, legally binding emission targets for every country.
(C) focuses exclusively on deforestation and not on industrial emissions.
(D) requires all parties to put forward their best efforts through "Nationally Determined Contributions" (NDCs).

115. A city experiences frequent flash floods after moderate rainfall, a problem that was rare a few decades ago despite similar rainfall patterns. An analysis based on Human Ecology principles would most likely point to which change as a primary cause?
(A) An increase in urban development, leading to more impermeable surfaces.
(B) A shift in the global climate pattern.
(C) A genetic adaptation in the local population.
(D) A decrease in the intensity of solar radiation.

116. Consider the following statements about global warming and its consequences:
1. It is caused by the depletion of the ozone layer.
2. It leads to the thermal expansion of oceans and contributes to sea-level rise.
3. The primary cause is the enhanced greenhouse effect due to anthropogenic emissions.
4. Methane is a more potent greenhouse gas per molecule than carbon dioxide.
5. It is expected to decrease the frequency of extreme weather events.

Which of the above statements are correct?
(A) 1, 2, and 5
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 2 and 5 only

117. Which component is at the base of any ecological pyramid, be it of numbers, biomass, or energy?
(A) Consumers
(B) Producers
(C) Decomposers
(D) Carnivores

118. The main purpose of establishing a legal framework for the environment within a country is to:
(A) Eliminate all human impact on natural ecosystems.
(B) Provide a basis for regulating activities that impact the environment and to enforce compliance.
(C) Promote economic growth without any environmental considerations.
(D) Document the types of flora and fauna present in the country.

119. An ethical perspective holding that only human beings have moral standing and that the environment is valuable only for its utility to humans is called:
(A) Biocentrism
(B) Ecocentrism
(C) Misanthropy
(D) Anthropocentrism

120. Which of the following is NOT a geo-chemical cycle?
(A) Trophic Level Cycle
(B) Carbon Cycle
(C) Nitrogen Cycle
(D) Oxygen Cycle

121. "Sustainable Development Goal 7" aims to ensure:
(A) The end of poverty in all its forms

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175. The core principle of Deep Ecology, which separates it from more mainstream environmentalism, is:
(A) The focus on recycling and energy efficiency.
(B) The reliance on technological solutions to environmental problems.
(C) The belief in the intrinsic value of non-human nature (ecocentrism).
(D) The emphasis on human health as the primary reason for environmental protection.

176. Which of the following is NOT an example of land degradation?
(A) Desertification
(B) Afforestation
(C) Soil erosion
(D) Soil salinization

177. Read the given statements and select the correct option.
Statement I : The Paris Agreement aims to hold the increase in the global average temperature to well below 2°C above pre-industrial levels.
Statement II : The agreement operates on a 'top-down' system where the UN imposes binding emission cuts on each nation.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

178. A scenario where nutrient runoff from farms causes a massive algal bloom in a lake, which then die and decompose, depleting the oxygen and killing fish, is a classic example of:
(A) Atmospheric pollution
(B) Urban heat island
(C) Land degradation
(D) Eutrophication

179. What distinguishes a 'geo-chemical' cycle from a simple energy flow?
(A) Geo-chemical cycles only occur in the non-living environment.
(B) Energy flow involves both living and non-living components, while cycles do not.
(C) Geo-chemical cycles involve the recycling of matter, while energy flows in one direction.
(D) There is no fundamental difference between the two concepts.

180. Consider the following statements about ecosystem components and functions:
1. Ecosystems can be geographically classified into terrestrial and aquatic types.
2. Human ecology is irrelevant to the study of modern urban ecosystems.
3. Trophic levels describe the energy positions within a food web.
4. The flow of energy through an ecosystem is cyclic and highly efficient.
5. Geo-chemical cycles like the carbon cycle are essential for recycling nutrients.

Which of the above statements are correct?
(A) 1, 2, and 4
(B) 2, 3, and 5
(C) 1, 3, and 5
(D) 2 and 4 only

181. A key feature of the Brundtland Commission's definition of sustainable development is its emphasis on:
(A) Inter-generational equity, balancing the needs of present and future societies.
(B) Halting all future global economic development to preserve natural resources.
(C) Prioritizing the resource needs of the present generation above all others.
(D) Separating environmental concerns from broader economic and social policy frameworks.

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182. Which of the following is a primary component of photochemical smog, a type of atmospheric pollution?
(A) Carbon dioxide
(B) Water vapor
(C) Methane
(D) Ground-level ozone

183. The principle that all species have a right to exist is a cornerstone of which ethical viewpoint?
(A) Technocentrism
(B) Anthropocentrism
(C) Biocentrism/Ecocentrism
(D) Economic rationalism

184. In an ecosystem, which group is responsible for converting inorganic compounds into organic compounds, forming the base of the food web?
(A) Primary consumers
(B) Producers (autotrophs)
(C) Secondary consumers
(D) Decomposers

185. The Kyoto Protocol differentiated between "Annex I" and "Non-Annex I" countries to formalize the principle of:
(A) The Polluter Pays Principle.
(B) The Precautionary Principle.
(C) Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC).
(D) National Sovereignty over Resources.

186. Which of the following is an example of an ecosystem function?
(A) The total number of species in a forest.
(B) The process of nitrogen fixation and cycling.
(C) The average annual rainfall in a desert.
(D) The presence of a mountain range.

187. Which of the following is the best description of an Urban Heat Island?
(A) A phenomenon where rural areas are warmer than nearby cities.
(B) An island nation that has become completely urbanized.
(C) The increase in global average temperatures.
(D) A metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.

188. Read the given statements and select the correct option.
Statement I : An ecological pyramid of biomass represents the total dry weight of organisms at each trophic level.
Statement II : A pyramid of biomass can never be inverted.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

189. The main legal instrument in India that covers all aspects of the environment and provides for a comprehensive framework for its protection is the:
(A) Wildlife (Protection) Act, 1972
(B) Forest (Conservation) Act, 1980
(C) Environment (Protection) Act, 1986
(D) Water (Prevention and Control of Pollution) Act, 1974

190. Which international conference adopted Agenda 21 as a key outcome?
(A) The Stockholm Conference on the Human Environment, 1972
(B) The World Summit on Sustainable Development (WSSD) in Johannesburg, 2002
(C) The Paris Climate Conference (COP21), 2015
(D) The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992

191. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : Organisms in a food web can occupy multiple trophic levels.
Reason (R) : Omnivores, for example, may consume both plants (primary producers) and herbivores (primary consumers), thus functioning as both primary and secondary consumers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

192. What is a primary difference between a 'hazard' and a 'disaster'?
(A) Hazards are always natural, while disasters are always man-made.
(B) A hazard is a potential threat, while a disaster is the realization of that threat with significant impact on a community.
(C) Disasters are small-scale events, while hazards are large-scale.
(D) The terms are completely synonymous in

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environmental science.

193. The concept of Sustainable Development Goals (SDGs) is more comprehensive than the preceding Millennium Development Goals (MDGs) because:
(A) SDGs apply only to environmental issues.
(B) SDGs were legally binding for all nations.
(C) SDGs integrate economic, social, and environmental dimensions and apply universally to all countries.
(D) SDGs only focus on poverty in developing nations.

194. The flow of energy in an ecosystem is often depicted as a pyramid because:
(A) Energy is created at each successive trophic level.
(B) The organisms at the top are physically larger.
(C) Energy is recycled back to the producers.
(D) The amount of usable energy decreases significantly at each successive trophic level.

195. Match the environmental issues in List I with the causes in List II and select the correct option.
List I: (Environmental Issue)
P. Global Warming
Q. Acid Rain
R. Eutrophication
S. Urban Heat Island
List II: (Dominant Cause)
1. Nutrient runoff into water bodies
2. Anthropogenic heat and modified surfaces
3. Emission of SO_2 and NOx
4. Increased concentration of greenhouse gases
Codes:
(A) P-4, Q-3, R-1, S-2
(B) P-3, Q-4, R-2, S-1
(C) P-4, Q-1, R-3, S-2
(D) P-2, Q-3, R-1, S-4

196. Which of the following statements about the Paris Agreement is incorrect?
(A) It includes a goal to limit global temperature rise to well below 2 degrees Celsius.
(B) It establishes legally binding emission reduction targets for each individual country.
(C) It requires countries to submit Nationally Determined Contributions (NDCs).
(D) It includes provisions for a global stocktake to assess collective progress.

197. Which process in the carbon cycle is the primary way carbon stored in the biosphere is returned to the atmosphere?
(A) Photosynthesis
(B) Sedimentation
(C) Respiration by plants, animals, and decomposers
(D) Nitrogen fixation

198. From the perspective of Human Ecology, a city can be viewed as:
(A) A natural environment unmodified by humans.
(B) A social system completely detached from ecological principles.
(C) A temporary settlement with no long-term environmental impact.
(D) An ecosystem dominated by human activity, with its own flows of energy and materials.

199. The study of moral issues concerning the environment and humanity's relationship with it falls under the branch of philosophy known as:
(A) Environmental Ethics
(B) Epistemology
(C) Metaphysics
(D) Aesthetics

200. Consider the following statements regarding international environmental programmes:
1. The Brundtland Commission defined the concept of 'ecological footprint'.
2. The Kyoto Protocol set binding targets for greenhouse gas emissions for developed (Annex I) countries.
3. Agenda 21 is a legally binding treaty on sustainable development.
4. The Paris Agreement relies on Nationally Determined Contributions (NDCs) from all parties.
Which of the above statements are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 2 and 4
(D) 2 and 3

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201. Which of the following trophic levels contains the least amount of energy in a terrestrial ecosystem?
(A) Producers
(B) Tertiary Consumers
(C) Primary Consumers
(D) Secondary Consumers

202. Which of the following is NOT a component of a geo-chemical cycle?
(A) Trophic level
(B) Reservoir (e.g., atmosphere, oceans)
(C) Exchange pool (e.g., organisms)
(D) Cycling process (e.g., photosynthesis, decomposition)

203. Read the given statements and select the correct option.
Statement I : A food web is a simplified model showing a single pathway of energy flow.
Statement II : A food chain is a complex model illustrating all the interconnected feeding relationships in an ecosystem.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

204. The primary aim of environmental ethics is to:
(A) Calculate the economic value of all natural resources.
(B) Develop new technologies for pollution control.
(C) Study the geographical distribution of animal species.
(D) Propose moral principles to guide human interaction with the natural world.

205. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : Land degradation, through processes like deforestation and desertification, can exacerbate global warming.
Reason (R) : Degraded lands and removed forests reduce the biosphere's capacity to act as a carbon sink, absorbing atmospheric CO_2.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

206. Which Indian national policy or legal act provides for a specialized tribunal for the speedy and effective resolution of environmental disputes?
(A) The Environment (Protection) Act, 1986
(B) The National Green Tribunal Act, 2010
(C) The Wildlife (Protection) Act, 1972
(D) The National Environment Policy, 2006

207. The concept of 'sustainable development' was most prominently and widely defined by:
(A) The Kyoto Protocol
(B) The Paris Agreement
(C) Agenda 21
(D) The Brundtland Commission

208. Sustainable Development Goal 14 (Life Below Water) focuses on:
(A) Conserving and sustainably using the oceans, seas, and marine resources.
(B) Ensuring clean drinking water for all.
(C) Building resilient infrastructure.
(D) Halting terrestrial biodiversity loss.

209. A key difference in the approach between the Kyoto Protocol and the Paris Agreement is that the latter:
(A) Is legally binding in all its aspects, including emission targets.
(B) Applies only to developed countries.
(C) Adopts a 'bottom-up' approach with Nationally Determined Contributions.
(D) Excludes developing nations from any form of climate action.

210. Consider the following statements about Environmental Ethics:
1. It is a field of applied ethics.
2. It examines the moral basis of environmental responsibility.
3. Anthropocentrism is one of its major perspectives.
4. Deep Ecology is a radical, ecocentric form of

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environmental ethics.
5. It is solely concerned with animal rights.
Which of the above statements are correct?
(A) 1, 2, 3, and 4
(B) 1, 2, and 5
(C) 3, 4, and 5
(D) 1 and 5 only

211. Which of the following is a direct human impact on the carbon cycle?
(A) Volcanic eruptions
(B) Photosynthesis by marine phytoplankton
(C) The burning of fossil fuels
(D) Natural forest fires caused by lightning

212. In the context of an ecological pyramid, which parameter is always upright and never inverted?
(A) Pyramid of Numbers
(B) Pyramid of Energy
(C) Pyramid of Biomass
(D) Pyramid of Species

213. The geographic classification of a freshwater, stationary body of water ecosystem, such as a pond or a lake, is known as:
(A) A lotic ecosystem
(B) A marine ecosystem
(C) A lentic ecosystem
(D) A terrestrial ecosystem

214. Which of the following is an incorrect statement about a food web?
(A) It shows interlocking food chains.
(B) An organism can operate at several trophic levels.
(C) It increases the stability of the ecosystem.
(D) It represents a single, unbranched pathway for energy transfer.

215. The 'precautionary principle', often cited in environmental law, suggests that:
(A) Action on environmental issues should be postponed until there is complete scientific certainty.
(B) All development projects should be approved without delay.
(C) Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.
(D) The cost of pollution should be borne by the public, not the polluter.

216. The primary driver of the environmental hazard known as global warming is:
(A) The depletion of the stratospheric ozone layer.
(B) The enhanced greenhouse effect from increased anthropogenic emissions.
(C) The natural Milankovitch cycles.
(D) The release of aerosols that cool the planet.

217. Match the environmental acts in India in List I with the years of enactment in List II and select the correct option.
List I: (Environmental Act in India)
P. The Wildlife (Protection) Act
Q. The Water (Prevention and Control of Pollution) Act
R. The Forest (Conservation) Act
S. The Environment (Protection) Act
List II: (Year of Enactment)
1. 1986
2. 1972
3. 1980
4. 1974
Codes:
(A) P-1, Q-3, R-4, S-2
(B) P-2, Q-4, R-3, S-1
(C) P-2, Q-1, R-3, S-4
(D) P-3, Q-4, R-2, S-1

218. An anthropocentric environmental ethic argues that we should protect nature primarily because:
(A) A healthy environment is essential for human well-being and survival.
(B) Nature has intrinsic value.
(C) All species have an equal right to exist.
(D) Protecting nature is a divine commandment.

219. Read the given statements and select the correct option.
Statement I : The Kyoto Protocol set uniform emission reduction targets for all countries in the world.
Statement II : The Paris Agreement allows each country to define its own emission reduction target, known as an NDC.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are

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255. A geographer studying the impact of dam construction on fish populations and water flow in a river valley is most directly engaging with concepts from which field mentioned in the passage?
(A) Geographic classification focusing solely on terrestrial systems.
(B) Analysis of biotic components, excluding human influence.
(C) Human Ecology, by analyzing a human-induced change on an aquatic ecosystem.
(D) Examination of abiotic factors without considering living organisms.

Direction : Please read the following source carefully.

The functioning of an ecosystem is fundamentally governed by the flow of energy and the cycling of nutrients through its various components. This process is structured into trophic levels, which represent the position an organism occupies in a food chain. At the base are the producers (autotrophs), typically plants that convert solar energy into chemical energy. The subsequent levels consist of consumers (heterotrophs) who obtain energy by feeding on other organisms. A simple, linear pathway of energy transfer is called a food chain, whereas a more complex and realistic model showing interconnected food chains is known as a food web. The efficiency of energy transfer between trophic levels is notoriously low, with only about 10% of the energy from one level being incorporated into the next. This principle is visually represented by an ecological pyramid. While pyramids of numbers and biomass can sometimes be inverted (e.g., a single large tree supporting many insects), the pyramid of energy is always upright. This is because energy is always lost as heat at each successive trophic level, in accordance with thermodynamic laws, meaning the energy available at higher levels is progressively smaller than at the levels below.

Based on the above source, attempt the following five questions.

256. What is the primary distinction between a food chain and a food web?
(A) A food chain shows energy flow, while a food web shows nutrient cycling.
(B) A food chain represents a single linear pathway of energy, while a food web illustrates multiple interconnected pathways.
(C) A food chain includes producers and consumers, while a food web includes decomposers as well.
(D) A food chain is a model for aquatic ecosystems, while a food web is for terrestrial ecosystems.

257. According to the passage, why is the pyramid of energy always upright?
(A) Because organisms at higher trophic levels are always larger in size.
(B) Because there are always more individual organisms at lower trophic levels.
(C) Because producers have a greater biomass than primary consumers.
(D) Because energy is lost at each transfer between trophic levels.

258. An organism's position in the sequence of energy transfers in an ecosystem is referred to as its:
(A) trophic level.
(B) ecological pyramid.
(C) food web.
(D) abiotic component.

259. Based on the principle of energy transfer described, what can be inferred about the sustainability of diets?
(A) A diet based on primary consumers is more energy-efficient than one based on producers.
(B) All trophic levels provide the same amount of energy to the final consumer.
(C) A diet based on producers makes more efficient use of solar energy than one based on higher-level consumers.
(D) The energy efficiency of a food chain is independent of its length.

260. In an ecological pyramid, which of the following scenarios could lead to an inverted pyramid of numbers?
(A) A single, large oak tree supporting thousands of herbivorous insects.
(B) A large population of phytoplankton supporting a smaller population of zooplankton.
(C) Many grass plants supporting a smaller

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229. A national environmental policy serves as a:
(A) Legally binding international treaty.
(B) Detailed list of all species within the country's borders.
(C) Statement of a nation's intentions and principles for environmental management.
(D) Set of instructions for building pollution control equipment.

230. The "Clean Development Mechanism" (CDM) was a flexible mechanism established under which international agreement?
(A) Agenda 21
(B) The Paris Agreement
(C) The Brundtland Commission Report
(D) The Kyoto Protocol

231. Arrange the following in the correct sequence as they appear in a grazing food chain, from bottom to top.
1. Secondary Consumer
2. Producer
3. Tertiary Consumer
4. Primary Consumer

(A) 2, 4, 1, 3
(B) 2, 1, 4, 3
(C) 1, 2, 3, 4
(D) 4, 1, 3, 2

232. 'Biomagnification' refers to the:
(A) Growth of organisms in a laboratory setting.
(B) Increasing concentration of a substance in organisms at successively higher levels in a food chain.
(C) Natural increase in the biodiversity of an ecosystem over time.
(D) Use of biological agents to clean up pollution.

233. The concept of human-environment interaction as a system of mutual influence is central to:
(A) Geomorphology
(B) Climatology
(C) Human Ecology
(D) Petrology

234. In the context of geo-chemical cycles, what is a 'sink' or 'reservoir'?
(A) The process by which an element is transformed.
(B) The pathway an element takes through the food chain.
(C) An organism that helps to cycle an element.
(D) A component of the Earth system where an element is stored for a period.

235. The Paris Agreement's global stocktake mechanism is designed to:
(A) Punish countries that fail to meet their NDCs.
(B) Allocate funding for climate adaptation projects.
(C) Periodically assess collective progress towards achieving the agreement's long-term goals.
(D) Take an inventory of global fossil fuel reserves.

236. Which of the following is considered a major environmental disaster?
(A) Crop rotation
(B) The release of large amounts of industrial pollutants into a river.
(C) The use of solar panels for energy.
(D) The creation of a national park.

237. The 'Brundtland Report' linked environmental issues inextricably with:
(A) Economic development and social equity.
(B) Military strategy.
(C) Space exploration.
(D) Religious doctrines.

238. Read the given statements and select the correct option.
Statement I : The legal framework for environment in a country includes acts, rules, and notifications for pollution control and conservation.
Statement II : A country's environmental policy is a legally binding international document.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

239. The ultimate source of energy for nearly all ecosystems on Earth is:

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is Deep Ecology, which posits that all living beings and natural systems possess intrinsic value, independent of their utility to human beings. This perspective advocates for a form of biocentric equality, challenging the hierarchical view that places humans at the pinnacle of existence. Deep Ecology critiques what it terms 'shallow environmentalism,' which it argues is anthropocentric because its primary motivation for environmental protection is to secure resources and a healthy environment for human benefit. In contrast, Deep Ecology calls for a fundamental shift in consciousness and a recognition that humans are just one part of a larger ecological web, implying a need for significant changes in lifestyle and policy to reduce human impact and respect the rights of all forms of life to exist and flourish.

Based on the above source, attempt the following five questions.

266. Which concept is central to the philosophy of Deep Ecology?
(A) The utility of nature for human economic development.
(B) The intrinsic value of all living organisms.
(C) The management of natural resources for future human generations.
(D) The classification of species based on their benefit to humans.

267. How does Deep Ecology differentiate itself from 'shallow environmentalism'?
(A) By focusing on technological solutions to pollution.
(B) By rejecting a human-centered motivation for preserving nature.
(C) By prioritizing economic growth over environmental protection.
(D) By concentrating solely on the conservation of endangered species.

268. An argument that a forest should be preserved because its ancient trees have a right to exist, regardless of whether they provide timber or recreation for people, is an example of:
(A) a perspective rooted in Deep Ecology.
(B) an anthropocentric viewpoint.
(C) a 'shallow environmentalism' approach.
(D) an economic valuation of the environment.

269. What can be inferred about a policy guided by a strictly anthropocentric environmental ethic?
(A) It would prioritize the protection of all species equally.
(B) It would call for a reduction in the human population.
(C) It would value ecosystems only for the services they provide to humans.
(D) It would reject the use of technology in environmental management.

270. The concept of "biocentric equality" as described in the passage implies that:
(A) humans have greater moral standing than other species.
(B) only sentient animals have moral value.
(C) economic needs should be balanced equally with ecological needs.
(D) all living things have an equal right to exist and thrive.

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Direction : Please read the following source carefully.

Among the most pressing environmental hazards is Global Warming, defined as the long-term increase in Earth's average surface temperature due to human activities. This phenomenon is primarily driven by the enhanced greenhouse effect. The process begins when solar radiation reaches the Earth, with some being reflected back to space and the rest absorbed, warming the planet. The Earth then radiates this energy back as infrared radiation. Greenhouse gases (GHGs) in the atmosphere, such as carbon dioxide, methane, and nitrous oxide, are effective at absorbing this outgoing infrared radiation, trapping heat and preventing it from escaping into space, thus keeping the planet warm enough for life. However, human activities since the pre-industrial period, especially the burning of fossil fuels for energy, have drastically increased the concentration of these GHGs. This intensification of the natural greenhouse effect leads to an accumulation of excess heat in the climate system, resulting in the observed trend of global warming. It is important to distinguish this from climate change, which refers to the broader range of long-term changes in weather patterns and climate variables, of which global warming is a key component.

Based on the above source, attempt the following five questions.

(D) P-4, Q-3, R-1, S-2

249. Which of the following is a key reason for the formation of Urban Heat Islands?
(A) The high albedo of urban surfaces, which reflects heat.
(B) The large amount of vegetation, which releases heat through transpiration.
(C) The absorption of solar radiation by dark surfaces and the release of waste heat from buildings and vehicles.
(D) The low heat capacity of urban materials and the generation of anthropogenic heat.

250. Which of the following statements most accurately reflects the relationship between Agenda 21 and the Sustainable Development Goals (SDGs)?
(A) The SDGs are a legally binding version of the non-binding Agenda 21.
(B) Agenda 21 was a plan for developed countries, while the SDGs are for developing countries.
(C) Agenda 21 and the SDGs are unrelated and conflicting environmental frameworks.
(D) The SDGs are a more recent, universal, and goal-oriented framework that builds upon the principles established in Agenda 21.

Direction : Please read the following source carefully.

The study of an ecosystem involves understanding its fundamental components and their geographic context. Ecosystems are geographically classifiable into broad categories, primarily terrestrial (land-based) and aquatic (water-based), each with numerous sub-types determined by climatic, edaphic, and biotic factors. The core components of any ecosystem are the abiotic, or non-living, elements such as sunlight, water, soil, and temperature, and the biotic, or living, elements, which include all plants, animals, and microorganisms. Within this framework, the field of Human Ecology specifically investigates the relationships between human populations and their environments. It examines how human social structures, cultural practices, and technologies influence, and are influenced by, the ecological systems they inhabit. This perspective moves beyond viewing humans as external agents and instead considers them as integral, often dominant, components of ecosystems, whose activities can fundamentally alter ecosystem structure, function, and stability. The geographic classification of ecosystems provides a spatial framework for analyzing these complex human-environment interactions, from the impact of agriculture on grassland ecosystems to the effects of urbanization on coastal zones.

Based on the above source, attempt the following five questions.

251. Which of the following best defines the focus of Human Ecology?
(A) The classification of ecosystems into terrestrial and aquatic types.
(B) The study of the interactions between human societies and their environmental settings.
(C) The analysis of abiotic components like soil and temperature in isolation.
(D) The documentation of biotic species within a given geographical area.

252. According to the passage, the primary basis for the geographic classification of ecosystems is the distinction between:
(A) terrestrial and aquatic settings.
(B) human-dominated and natural environments.
(C) stable and unstable systems.
(D) biotic and abiotic components.

253. Which of the following would be considered an abiotic component of an ecosystem?
(A) Fungi breaking down dead wood.
(B) Algae photosynthesizing in a pond.
(C) The average annual rainfall in a forest.
(D) The population of herbivores in a grassland.

254. Based on the passage, what can be inferred about the role of humans in ecosystems from a Human Ecology perspective?
(A) Humans are always external disruptors of otherwise balanced natural systems.
(B) Human influence is negligible in large-scale ecosystems like oceans.
(C) Human impact is primarily studied through the lens of biotic components only.
(D) Humans are considered an integrated part of ecosystems, capable of significantly modifying them.

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incorrect.
(C) Statement I is incorrect, but Statement II is correct.
(D) Statement I is correct, but Statement II is incorrect.

220. The gradual enrichment of a water body with nutrients, leading to excessive plant growth and oxygen depletion, is termed:
(A) Salinization
(B) Desertification
(C) Acidification
(D) Eutrophication

221. Which of the following statements about Human Ecology is correct?
(A) It views humans as being outside of and exempt from ecological principles.
(B) It analyzes how human societies and their environments mutually influence each other.
(C) It focuses only on the impact of the environment on humans, not the other way around.
(D) It is a field of study concerned only with primitive, tribal societies.

222. Which of these is an example of an abiotic component of an ecosystem?
(A) A tree
(B) A fungus
(C) A deer
(D) The sunlight

223. What is the main purpose of an Ecological Pyramid?
(A) To show the geographic distribution of a species.
(B) To list all the species present in an ecosystem.
(C) To graphically represent the structure and function of trophic levels in an ecosystem.
(D) To map the flow of water in a watershed.

224. The combustion of fossil fuels affects the carbon cycle by:
(A) Increasing the rate of photosynthesis globally.
(B) Rapidly releasing large quantities of carbon that were stored for millions of years.
(C) Sequestering carbon in deep ocean sediments.
(D) Decreasing the amount of carbon dioxide in the atmosphere.

225. Which of the following is NOT an objective of the Sustainable Development Goals (SDGs)?
(A) To end poverty and hunger.
(B) To promote gender equality.
(C) To establish a single global government.
(D) To combat climate change.

226. Consider the following statements about ecosystem functions:
1. Primary producers form the first trophic level.
2. Energy flows from consumers to producers.
3. The nitrogen cycle is an example of a geo-chemical cycle.
4. A food web is less stable than a food chain.

Which of the above statements are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 2, and 3
(D) 2, 3, and 4

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227. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A) : Deep ecologists critique mainstream environmentalism as being too "shallow."
Reason (R) : They argue that shallow environmentalism is anthropocentric, focusing only on fixing problems like pollution for human benefit, rather than addressing the root philosophical cause of human-centeredness.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

228. Which of the following is a primary characteristic of the Urban Heat Island effect?
(A) Reduced air pollution in city centers.
(B) Increased albedo of urban surfaces.
(C) Greater vegetation cover in cities than in the countryside.
(D) Higher air temperatures in urban areas compared to surrounding rural areas.

number of deer.
(D) A large number of rodents being preyed upon by a few snakes.

Direction : Please read the following source carefully.

The persistence of life within ecosystems depends on the continuous circulation of essential elements through the biotic and abiotic components of the Earth system, a process known as a geo-chemical cycle. Among the most critical are the carbon, nitrogen, and oxygen cycles. The carbon cycle involves the movement of carbon between the atmosphere, oceans, land, and living organisms. Key processes include photosynthesis, where plants absorb atmospheric carbon dioxide, and respiration, where organisms release it. The nitrogen cycle is more complex, as atmospheric nitrogen (N_2) is largely unavailable to most organisms. It must first be converted into usable forms like ammonia and nitrates through nitrogen fixation, a process carried out by certain bacteria. Nitrification and denitrification are other microbially-mediated processes that transform and eventually return nitrogen gas to the atmosphere. The oxygen cycle is intricately linked with the carbon cycle. The primary source of free atmospheric oxygen is photosynthesis, where water molecules are split, releasing oxygen as a byproduct. Conversely, oxygen is consumed by most living organisms during aerobic respiration, a process that also releases carbon dioxide, thereby connecting the two cycles in a fundamental feedback loop that sustains life.

Based on the above source, attempt the following five questions.

261. What is the defining characteristic of a geo-chemical cycle?
(A) The one-way flow of energy through an ecosystem.
(B) The transformation of elements exclusively within the biotic realm.
(C) The fixation of atmospheric gases into solid forms by plants.
(D) The circulation of elements between living organisms and the non-living environment.

262. The conversion of atmospheric nitrogen gas into forms usable by plants is a crucial process known as:
(A) denitrification.
(B) nitrogen fixation.
(C) photosynthesis.
(D) respiration.

263. According to the passage, what is the primary process that replenishes free oxygen in the Earth's atmosphere?
(A) The respiration of animals and humans.
(B) The decomposition of organic matter.
(C) The splitting of water molecules during photosynthesis.
(D) The conversion of nitrates back to nitrogen gas.

264. What can be inferred about the relationship between the carbon and oxygen cycles?
(A) They operate completely independently of one another.
(B) Both cycles are primarily driven by geological processes rather than biological ones.
(C) The carbon cycle releases oxygen, while the oxygen cycle releases carbon.
(D) The processes that generate atmospheric oxygen tend to consume atmospheric carbon, and vice versa.

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265. A significant portion of Earth's carbon is stored in reservoirs like oceans and the atmosphere. Which process is primarily responsible for transferring carbon from the atmosphere into the biotic components of terrestrial ecosystems?
(A) Photosynthesis by plants.
(B) Respiration by plants and animals.
(C) Decomposition of organic matter.
(D) Nitrogen fixation by bacteria.

Direction : Please read the following source carefully.

Human interaction with the environment is not merely a physical process but is also guided by underlying philosophical and ethical principles. Environmental ethics is the branch of philosophy that studies the moral relationship of human beings to, and also the value and moral status of, the environment and its non-human contents. A critical distinction within this field is between anthropocentric (human-centered) and non-anthropocentric viewpoints. One of the most prominent non-anthropocentric philosophies

(A) Geothermal heat
(B) Chemical energy from fossil fuels
(C) Wind energy
(D) Solar radiation

240. Consider the following statements related to international environmental treaties:
1. The Kyoto Protocol set binding targets for greenhouse gas emissions for developed countries.
2. The Paris Agreement includes commitments from both developed and developing countries in the form of NDCs.
3. Agenda 21 was a direct outcome of the Brundtland Commission.
4. The Sustainable Development Goals replaced the Kyoto Protocol in 2015.
5. The Brundtland Commission Report popularized the concept of sustainable development.

(A) 1, 3 and 4
(B) 2, 3 and 5
(C) 1, 2 and 5
(D) 1, 4 and 5

241. A hawk that eats a snake which has eaten a frog, which has eaten a grasshopper, which has eaten grass, is a:
(A) Primary consumer
(B) Quaternary consumer
(C) Secondary consumer
(D) Tertiary consumer

242. The process of land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities, is known as:
(A) Desertification
(B) Eutrophication
(C) Deforestation
(D) Salinization

243. The philosophy of Deep Ecology is best described as:
(A) Anthropocentric
(B) Technocentric
(C) Ecocentric
(D) Heliocentric

244. Which of the following correctly pairs an SDG with its goal?
(A) SDG 13 - Zero Hunger
(B) SDG 15 - Gender Equality
(C) SDG 7 - Life Below Water
(D) SDG 6 - Clean Water and Sanitation

245. An Environmental Impact Assessment (EIA), as part of a national legal framework, is primarily a tool for:
(A) Punishing past environmental violations.
(B) Marketing green products.
(C) Predicting and evaluating the environmental consequences of a future project.
(D) Auditing the financial performance of a company.

246. Arrange the following steps of eutrophication in the correct chronological sequence.
1. Nutrient enrichment
2. Algal bloom
3. Decomposition and oxygen depletion
4. Fish kill

(A) 1, 2, 3, 4
(B) 2, 1, 4, 3
(C) 3, 1, 4, 2
(D) 1, 4, 3, 2

247. The primary role of decomposers in the geo-chemical cycles is to:
(A) Create energy for the ecosystem.
(B) Consume producers at the first trophic level.
(C) Fix atmospheric gases into usable forms.
(D) Return essential elements from dead organic matter to their inorganic form.

248. Match the terms in List I with the examples or descriptions in List II and select the correct option.
List I: (Term)
P. Abiotic factor
Q. Primary Consumer
R. Detritivore
S. Geo-chemical cycle
List II: (Example/Description)
1. Earthworm
2. Rabbit
3. Temperature
4. Nitrogen Cycle
Codes:
(A) P-3, Q-2, R-1, S-4
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-2, S-4

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271. What is the primary cause of the current trend of Global Warming, according to the passage?
(A) Natural fluctuations in solar radiation.
(B) A decrease in the Earth's ability to reflect sunlight.
(C) An increase in heat-trapping gases due to human activities.
(D) The natural cycle of ice ages and interglacial periods.

272. The mechanism by which greenhouse gases contribute to global warming is by:
(A) directly producing heat through chemical reactions in the atmosphere.
(B) absorbing outgoing infrared radiation from the Earth's surface.
(C) reflecting incoming solar radiation back towards the Earth.
(D) destroying the ozone layer, allowing more radiation to reach the surface.

273. How does the passage distinguish between Global Warming and climate change?
(A) They are identical terms for the same phenomenon.
(B) Global Warming is a natural process, while climate change is human-induced.
(C) Climate change is a short-term effect, whereas Global Warming is a long-term trend.
(D) Global Warming refers specifically to temperature increase, while climate change encompasses a wider range of long-term weather pattern shifts.

274. Based on the passage, what is the most direct consequence of increasing the concentration of greenhouse gases in the atmosphere?
(A) More heat will be trapped in the atmosphere, preventing it from escaping to space.
(B) A greater amount of solar radiation will reach the Earth's surface.
(C) The Earth's surface will cool due to increased reflection of heat.
(D) The chemical composition of the oceans will change instantly.

275. An industrial process that releases large quantities of carbon dioxide and methane into the atmosphere is a direct contributor to which environmental hazard described in the passage?
(A) The creation of an urban heat island.
(B) The natural greenhouse effect required for life.
(C) The enhanced greenhouse effect leading to global warming.
(D) The depletion of atmospheric oxygen.

Direction : Please read the following source carefully.

Environmental hazards are often concentrated in and exacerbated by urban environments. A distinct phenomenon is the Urban Heat Island (UHI) effect, where a metropolitan area is significantly warmer than its surrounding rural areas. This temperature difference is primarily attributed to the modification of land surfaces, such as the replacement of natural vegetation with asphalt and concrete which absorb and retain more solar radiation, and the generation of waste heat from human activities like transport and industry. Concurrently, cities are major sources of atmospheric pollution. Emissions from vehicles and industrial facilities release pollutants like particulate matter (PM), nitrogen oxides (NOx), and volatile organic compounds (VOCs), which can lead to smog formation and pose serious health risks. These urban environmental issues are interconnected. For instance, atmospheric pollution can be linked to water pollution. Urban runoff, the surface flow of water resulting from rainfall, carries accumulated pollutants from streets, rooftops, and industrial sites—including heavy metals, oil, and chemicals—into storm drains and subsequently into nearby rivers, lakes, and coastal waters. This non-point source pollution degrades water quality, harms aquatic life, and can contaminate water supplies, illustrating the complex web of environmental challenges within urban systems.

Based on the above source, attempt the following five questions.

276. The primary cause of the Urban Heat Island effect is described as:
(A) land surface modification and waste heat generation.
(B) increased rainfall in urban areas.
(C) high population density alone.
(D) excessive water pollution in city rivers.

NODIA

277. Which of the following is an example of an atmospheric pollutant commonly found in urban environments mentioned in the passage?
(A) Carbon dioxide from respiration.
(B) Pure water vapor.
(C) Oxygen released by parks.
(D) Nitrogen oxides from vehicle emissions.

278. The passage describes urban runoff as a significant contributor to:
(A) the Urban Heat Island effect.
(B) water pollution from non-point sources.
(C) the formation of the ozone layer.
(D) atmospheric pollution through evaporation.

279. What can be inferred about the relationship between the Urban Heat Island effect and energy consumption?
(A) The UHI effect reduces the need for air conditioning, thus lowering energy consumption.
(B) The UHI effect is completely independent of urban energy consumption patterns.
(C) Higher temperatures in cities can increase the demand for cooling, leading to higher energy use and more waste heat.
(D) The materials that cause the UHI effect are excellent for generating renewable energy.

280. During a heavy rainstorm in a large city, pollutants such as oil from roads and chemicals from industrial yards are washed into a nearby river. This scenario is a direct example of:
(A) land degradation.
(B) the Urban Heat Island effect.
(C) atmospheric pollution.
(D) water pollution via urban runoff.

Direction : Please read the following source carefully.

Land degradation is a pervasive environmental hazard defined as the deterioration or loss of the productive capacity of land, affecting its biological and economic utility. This process manifests in various forms, including soil erosion by wind and water, desertification (the degradation of land in arid and semi-arid areas), chemical deterioration such as salinization and acidification, and physical degradation like soil compaction. While natural processes can contribute, land degradation is predominantly accelerated by unsustainable human activities. Deforestation, which exposes soil to erosion; improper agricultural practices, such as excessive tillage and inadequate crop rotation; overgrazing, which strips vegetation cover; and rapid urbanization, which seals the soil surface, are all major drivers. The consequences extend beyond the loss of fertile land for agriculture. Degraded land has a reduced capacity to function as a carbon sink, potentially exacerbating climate change by diminishing the soil's ability to sequester carbon. Furthermore, it leads to a loss of biodiversity as habitats are destroyed and contributes to water pollution as eroded sediment clogs waterways. It is a complex environmental problem that interlinks soil health, climate regulation, and ecosystem stability.

Based on the above source, attempt the following five questions.

281. Which of the following best defines land degradation?
(A) The reduction in the biological or economic productivity of land.
(B) The exclusive expansion of deserts into fertile areas.
(C) The process of urbanizing rural landscapes.
(D) The natural weathering of rocks into soil.

282. The passage identifies all of the following as human activities that accelerate land degradation EXCEPT:
(A) deforestation for timber.
(B) planting diverse cover crops.
(C) overgrazing by livestock.
(D) improper agricultural tillage.

283. Salinization, the accumulation of salts in soil, is mentioned as a form of:
(A) physical degradation.
(B) chemical deterioration.
(C) biological enhancement.
(D) desertification.

284. What can be inferred about the relationship between land degradation and climate change?
(A) Land degradation can contribute to climate change by reducing the land's capacity to store carbon.
(B) Climate change is the sole cause of land degradation.
(C) Land degradation has no impact on the

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global climate.
(D) The processes are unrelated.

285. A farmer in a semi-arid region repeatedly plants the same water-intensive crop without allowing the land to recover, leading to severe soil erosion and loss of fertility. This is a direct example of land degradation caused by:
(A) urbanization.
(B) natural desertification cycles.
(C) improper agricultural practices.
(D) salinization from sea-level rise.

Direction : Please read the following source carefully.

A nation's response to environmental challenges is typically structured through a hierarchical system of governance, beginning with a robust legal framework. This framework consists of a body of laws, acts, and regulations legislated by the state to control pollution, conserve natural resources, and manage environmental quality. For instance, specific acts may govern air and water quality standards, waste management, and the protection of forests and wildlife. Stemming from these legal mandates is the national environmental policy, which articulates the government's overall vision, objectives, and principles for environmental stewardship. The policy serves as a guiding document that sets priorities and outlines the intended direction for environmental action across all sectors. To implement both the legal requirements and policy goals, governments then create specific national programmes and action plans. These are the operational instruments of environmental management, such as a national mission to promote renewable energy, a programme for cleaning major rivers, or an action plan on climate change. This structured approach, from law to policy to programme, ensures that environmental objectives are not just abstract ideals but are translated into concrete, actionable, and measurable initiatives within the country.

Based on the above source, attempt the following five questions.

286. What is the primary function of a national environmental legal framework?
(A) To articulate the government's general vision for the environment.
(B) To create specific, time-bound action plans for projects.
(C) To fund international environmental treaties.
(D) To provide the enforceable laws and regulations for environmental protection.

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287. What is the relationship between a national environmental policy and a national programme?
(A) A programme establishes the legal basis for a policy.
(B) A policy is a specific project, while a programme is a general vision.
(C) A programme is a specific initiative designed to implement the goals set out in a policy.
(D) A policy and a programme are identical and interchangeable terms.

288. According to the passage, the hierarchical structure of national environmental governance generally flows in which order?
(A) Policy → Programme → Legal Framework
(B) Legal Framework → Policy → Programme
(C) Programme → Legal Framework → Policy
(D) Policy → Legal Framework → Programme

289. A government document that states "Our nation aims to reduce carbon emissions by 30% by 2030 and promote sustainable development across all economic sectors" would best be classified as:
(A) a legal act.
(B) a specific action programme.
(C) a court ruling.
(D) an environmental policy.

290. Based on the passage, what can be inferred about the effectiveness of an environmental policy without a supporting legal framework?
(A) It would lack the legal authority needed for enforcement.
(B) It would be more effective as it allows for greater flexibility.
(C) It would be the highest form of environmental protection.
(D) It would automatically create national programmes.

Direction : Please read the following source carefully.

The foundation of modern international

environmental cooperation was significantly advanced by the Brundtland Commission, officially the World Commission on Environment and Development. In its seminal 1987 report, "Our Common Future," the commission introduced and popularized the concept of sustainable development. This was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition successfully bridged the gap between environmental conservation and economic development, framing them as intertwined rather than conflicting goals. The principles championed by the Brundtland Commission were institutionalized on a global scale at the 1992 United Nations Conference on Environment and Development, also known as the Earth Summit. A key outcome of this summit was Agenda 21, a comprehensive, non-binding action plan for achieving sustainable development in the 21st century. Agenda 21 provided a detailed blueprint for implementation at global, national, and local levels, addressing a wide array of issues where human activities impact the environment and laying the conceptual and political groundwork for future international environmental agreements.

Based on the above source, attempt the following five questions.

291. What was the key conceptual contribution of the Brundtland Commission's report, "Our Common Future"?
(A) It created a legally binding treaty to reduce pollution.
(B) It was the first document to identify climate change as a threat.
(C) It defined and popularized the concept of sustainable development.
(D) It focused exclusively on the preservation of wildlife in developing nations.

292. According to the definition from the Brundtland Commission, sustainable development primarily seeks to balance present needs with:
(A) the needs of future generations.
(B) the profit motives of multinational corporations.
(C) the immediate demands of industrial growth.
(D) the preservation of the environment in its pristine state.

293. Agenda 21 is best described as:
(A) a binding international law requiring emission cuts.
(B) a report on the state of the world's oceans.
(C) a charter for the World Commission on Environment and Development.
(D) a non-binding action plan for sustainable development.

294. What is the relationship between the Brundtland Commission and Agenda 21 as described in the passage?
(A) The Brundtland Commission was formed to oppose the implementation of Agenda 21.
(B) Agenda 21 was a plan of action that built upon the principles of sustainable development popularized by the Brundtland Commission.
(C) Agenda 21 was the report that established the Brundtland Commission.
(D) The two initiatives were developed independently and have conflicting goals.

295. The scope of Agenda 21, as implied by the passage, was:
(A) narrowly focused on reducing greenhouse gas emissions.
(B) limited to actions taken by the United Nations itself.
(C) comprehensive, covering actions from the global to the local level.
(D) legally enforceable by an international court.

Direction : Please read the following source carefully.

The international framework for addressing climate change has evolved through a series of landmark agreements. The Kyoto Protocol, adopted in 1997, established a precedent by setting legally binding emission reduction targets for industrialized countries, operating under the principle of "common but differentiated responsibilities," which acknowledged that developed nations have a greater historical responsibility for emissions. This approach was later revised in the Paris Agreement of 2015, which created a more inclusive and universal framework. The Paris Agreement's central aim is to keep the

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global temperature rise this century well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit it to 1.5 degrees Celsius. A key feature of this agreement is that it requires all signatory nations, both developed and developing, to prepare and communicate their own climate action plans, known as Nationally Determined Contributions (NDCs). Running parallel to these climate-specific treaties are the Sustainable Development Goals (SDGs), part of the 2030 Agenda for Sustainable Development adopted in 2015. The 17 SDGs are a universal set of goals for all countries to achieve, and they integrate climate action (SDG 13) with other critical objectives like ending poverty, ensuring health, and promoting equality, thereby reinforcing the Paris Agreement's objectives within a broader development context.

Based on the above source, attempt the following five questions.

296. A primary distinguishing feature of the Kyoto Protocol was its:
(A) focus on voluntary contributions from all nations.
(B) goal of limiting temperature rise to 1.5 degrees Celsius.
(C) integration with the Sustainable Development Goals.
(D) establishment of binding emission targets for industrialized nations only.

297. What is the central aim of the Paris Agreement?
(A) To significantly limit the rise in global average temperature.
(B) To assign historical blame for climate change.
(C) To create a fund for environmental research exclusively.
(D) To enforce the same emission reduction target on every country.

298. How does the approach of the Paris Agreement differ from that of the Kyoto Protocol?
(A) The Paris Agreement is legally binding, whereas the Kyoto Protocol was voluntary.
(B) The Paris Agreement requires climate action plans from all nations, not just industrialized ones.
(C) The Paris Agreement focuses on water pollution, while the Kyoto Protocol focused on air pollution.
(D) The Kyoto Protocol used NDCs, while the Paris Agreement uses differentiated responsibilities.

299. What is the nature of the Sustainable Development Goals (SDGs)?
(A) A legally binding climate treaty that replaced the Paris Agreement.
(B) A universal framework of goals integrating development and environmental protection.
(C) A set of goals exclusively for developing countries to reduce poverty.
(D) A scientific report on the impacts of global warming.

300. What can be inferred from the passage about the relationship between the Paris Agreement and the SDGs?
(A) The SDGs and the Paris Agreement are mutually reinforcing, with goals like SDG 13 directly supporting climate action.
(B) They are competing frameworks with conflicting objectives.
(C) The Paris Agreement is a single goal within the broader set of SDGs.
(D) The SDGs were replaced by the more specific targets of the Paris Agreement.

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impact of anthropogenic changes on long-term environmental stability.

30. (A) Hydrological (Water) Cycle
The hydrological cycle describes the continuous movement of water on, above, and below the surface of the Earth. It involves several key physical processes, including evaporation from oceans, condensation into clouds, and precipitation back to the surface. Transpiration by plants also contributes significant moisture to the atmosphere. This cycle ensures the redistribution of fresh water globally and is essential for supporting life and regulating temperatures across various terrestrial and aquatic ecosystems and the lithosphere.

31. (D) A forest ecosystem where one large tree supports thousands of insects.
An ecological pyramid of numbers represents the total count of individual organisms at each trophic level. While usually upright, it can be inverted in specific scenarios, such as a forest ecosystem where a single large tree serves as the primary producer. This one individual supports thousands of herbivorous insects, which may then support fewer predatory birds. In this case, the base of the pyramid is significantly narrower than the higher levels, demonstrating an atypical number distribution.

32. (B) Nitrates to atmospheric nitrogen.
Denitrification is a vital biological process in the nitrogen cycle that returns nitrogen to the atmosphere. Specialized anaerobic bacteria in the soil or water convert nitrates and nitrites back into gaseous nitrogen. This process occurs primarily in environments with low oxygen levels, such as waterlogged soils or deep sediments. It balances the cycle by preventing the over-accumulation of nitrogen in ecosystems and maintaining the stable composition of Earth's atmosphere, which is mostly nitrogen gas.

33. (B) Photosynthesis releases oxygen, while respiration consumes it.
The oxygen cycle involves the movement of oxygen through the atmosphere, biosphere, and lithosphere. Its primary biological components are photosynthesis and respiration. During photosynthesis, green plants and algae use carbon dioxide and sunlight to produce oxygen as a byproduct. Conversely, aerobic organisms consume this oxygen during respiration to release energy from food, producing carbon dioxide. This continuous exchange maintains stable atmospheric oxygen levels necessary for the survival of most life forms and ecological system functioning.

34. (A) Land Degradation
The removal of fertile topsoil by natural forces like wind and water is a primary symptom of land degradation. This process, known as soil erosion, significantly reduces the land's agricultural productivity and ecological health. When topsoil is lost, essential nutrients and organic matter are depleted, making it difficult for vegetation to grow. This can lead to further issues such as desertification and increased vulnerability to floods, impacting local food security and the overall ecosystem balance.

35. (C) The Bhopal Gas Tragedy
The Environment Protection Act of 1986 was enacted in India as a direct response to the catastrophic Bhopal Gas Tragedy of 1984. This disaster highlighted significant gaps in the existing legal and regulatory framework for industrial safety and environmental protection. The act empowered the central government to set standards, coordinate activities of various authorities, and take stringent measures to prevent and control pollution, thereby strengthening the nation's environmental governance and protecting its citizens from industrial hazards.

36. (D) 1, 2, 3, 4, and 5
A nation's environmental policy and legal framework encompass a wide range of management strategies. These include setting emission standards for industries, conserving biodiversity through protected areas, and promoting renewable energy. Additionally, they mandate environmental impact assessments for new projects and establish protocols for remediating contaminated sites. These integrated components work together to regulate human activities, protect natural resources, and ensure long-term ecological sustainability and public health while meeting international environmental commitments and domestic conservation goals.

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8. (A) P-2, Q-4, R-1, S-3
A food chain describes a linear pathway of energy transfer between organisms. Food webs provide a more realistic model by showing multiple interconnected and interdependent chains within a community. Ecological pyramids are graphical tools used to represent biomass or productivity at different levels. Trophic levels identify the specific position an organism holds in the feeding hierarchy. Together, these concepts illustrate the complex functional structure of various natural ecosystems and the relationships between living species.

9. (C) A rabbit
Primary consumers occupy the second trophic level in an ecosystem and feed directly on primary producers. In terrestrial environments, these organisms are typically herbivores like rabbits, deer, or grasshoppers. They play a critical role in transferring energy stored in plant biomass to higher-level carnivores. Unlike decomposers or producers, primary consumers rely solely on consuming living plant matter for their nutritional needs and survival within the habitat, forming a link to higher predators.

10. (A) It promotes a human-centered (anthropocentric) view of the environment.
Deep Ecology is a radical environmental philosophy that rejects anthropocentrism in favor of an ecocentric worldview. It asserts that all living beings possess intrinsic worth, independent of their utility to humans. The philosophy advocates for fundamental changes in human values and social structures to protect the integrity of the biosphere. It critiques modern industrial society for viewing nature merely as a resource and promotes a smaller human population to reduce the overall environmental impact.

11. (D) Urban Heat Island
The Urban Heat Island effect occurs when metropolitan areas experience significantly higher temperatures than their surrounding rural environments. This phenomenon is primarily caused by the replacement of natural vegetation with heat-absorbing materials like concrete and asphalt. These surfaces retain solar energy and release it slowly. Additional factors include waste heat from vehicles and buildings, as well as reduced evaporative cooling due to limited green spaces in cities, leading to localized warming and climate modification.

12. (A) 1 and 2 only
Food webs provide a comprehensive and realistic representation of feeding relationships in nature. Unlike linear food chains, they account for the fact that most organisms have multiple food sources and predators. Within these complex networks, a single species can often occupy different trophic levels depending on what it consumes. This complexity increases ecosystem stability. Removing one species typically triggers various indirect effects throughout the entire biological community, demonstrating the high level of species interdependence.

13. (A) Both A and R are true and R is the correct explanation of A.
The ten percent rule explains that only a small portion of energy is transferred between successive trophic levels. Most energy consumed by an organism is used for its own life processes, such as respiration, movement, and growth. A significant amount of this energy is dissipated into the environment as heat. Consequently, very little energy remains available for predators. This inefficiency limits the total number of levels possible in most food chains and ecological systems.

14. (D) Atmospheric Pollution
Particulate matter refers to a complex mixture of extremely small solid particles and liquid droplets suspended in the air. PM2.5 and PM10 are major components of atmospheric pollution that pose significant risks to human health and the environment. These pollutants originate from various sources, including vehicle exhausts, industrial processes, and construction activities. They reduce visibility and can penetrate deep into the respiratory system, causing severe diseases while also impacting global climate and local weather patterns.

15. (A) The runoff of nutrient-rich fertilizers from agricultural lands.
Cultural eutrophication is a form of water pollution accelerated by human activities. It primarily results from the runoff of excess nutrients, specifically nitrogen and phosphorus,

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from agricultural fields into water bodies. These nutrients trigger the rapid growth of algae, leading to blooms that block sunlight and deplete dissolved oxygen. This process degrades water quality and often results in massive die-offs of fish and other aquatic organisms, disrupting the entire local aquatic food web.

16. (B) Overgrazing
Land degradation involves the deterioration of soil quality and productive capacity due to human activities or natural processes. Overgrazing is a primary anthropogenic cause where livestock consume vegetation faster than it can recover. This removes protective ground cover, making the soil vulnerable to erosion by wind and water. It often leads to desertification in arid regions and significantly reduces the land's ability to support diverse plant life, ultimately impacting agriculture and local ecological health.

17. (B) Oxygen (O_2)
Greenhouse gases are atmospheric components that trap outgoing infrared radiation, leading to the warming of the Earth's surface. Major examples include carbon dioxide, methane, and nitrous oxide, which are primarily increased through industrial and agricultural activities. Oxygen, while essential for life and making up a large portion of the atmosphere, does not possess the molecular structure required to trap heat. Therefore, it does not contribute to global warming or the greenhouse effect in any significant way.

18. (A) Sustainable Development
The Brundtland Commission, formally known as the World Commission on Environment and Development, is renowned for its 1987 report. This document, titled Our Common Future, provided the definitive definition and popularization of sustainable development. The concept emphasizes meeting the needs of the current generation without compromising the ability of future generations to meet their own. It successfully integrated environmental protection with economic growth and social equity, influencing global policy for decades to follow.

19. (C) Greenhouse gas emissions.
The Kyoto Protocol was an international treaty adopted in 1997 to address global climate change. It extended the 1992 United Nations Framework Convention on Climate Change by committing industrialized nations to legally binding targets for reducing greenhouse gas emissions. The protocol focused on gases like carbon dioxide, methane, and nitrous oxide. It established market-based mechanisms to help countries achieve their targets while encouraging the transition to cleaner energy and sustainable industrial practices worldwide.

20. (A) 4, 3, 2, 1
The Brundtland Commission Report was published in 1987, introducing sustainable development to the global stage. Agenda 21 was subsequently adopted at the 1992 Rio Earth Summit as a non-binding action plan. The Kyoto Protocol followed in 1997, setting specific emission targets for developed nations. Finally, the Paris Agreement was adopted in 2015, establishing a universal framework for climate action involving all countries through nationally determined contributions. This sequence marks the evolution of modern international environmental policy.

21. (B) 1 and 2
The Environment Protection Act of 1986 provides a comprehensive legal framework for coordinating environmental protection activities in India. Following this, the National Green Tribunal was established as a specialized judicial body to handle environmental disputes efficiently. The Forest Conservation Act aims to protect forests rather than increase agricultural land. Additionally, the Wildlife Protection Act was enacted much earlier, in 1972, to safeguard the country's diverse fauna and flora, showing a long history of legislative commitment.

22. (B) The 2030 Agenda for Sustainable Development
The 17 Sustainable Development Goals were adopted by all United Nations Member States in 2015. They form the core of the 2030 Agenda for Sustainable Development, providing a shared blueprint for peace and prosperity. These goals are universal and integrated, addressing economic growth, social inclusion, and environmental protection. They succeeded the Millennium Development Goals and represent a more comprehensive and ambitious global

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commitment to tackling pressing challenges like climate change, poverty, and systemic inequality.

23. (D) 2.0°C.
The Paris Agreement is a legally binding international treaty on climate change adopted in 2015. Its central objective is to limit the increase in global average temperature to well below 2 degrees Celsius compared to pre-industrial levels. Furthermore, the agreement encourages efforts to restrict the temperature rise to 1.5 degrees Celsius. Achieving these targets requires significant reductions in global greenhouse gas emissions through coordinated national and international actions, alongside technological innovation and financial investments.

24. (A) To break down dead organic matter and recycle nutrients.
Decomposers, primarily bacteria and fungi, perform a fundamental role in maintaining ecosystem health. They break down complex organic matter from dead plants and animals into simpler inorganic nutrients. This process, known as decomposition, returns essential elements like nitrogen and phosphorus to the soil or water. Without decomposers, nutrients would remain trapped in organic remains, leading to a depletion of resources and a eventual collapse of the entire food web within the biological community.

25. (C) Instruction: The prevailing climatic and physical conditions characterizing a specific region.
Geographic classification of ecosystems categorizes natural systems based on their dominant environmental features and regional climates. Factors such as temperature, precipitation, and soil type determine the characteristic vegetation and animal life found in specific biomes. For instance, deserts, tropical rainforests, and tundras are defined by these physical parameters rather than specific species lists. This approach allows scientists to study how different environmental conditions shape ecological structure and function on a global and regional scale.

26. (C) Statement I is correct, but Statement II is incorrect.
Environmental ethics explores the moral obligations humans have toward the natural world. It investigates whether nature has intrinsic value or exists solely for human benefit. Anthropocentrism is a specific viewpoint that prioritizes human interests and views the environment as a resource for human utility. In contrast, ecocentrism and biocentrism assign intrinsic value to all living organisms and ecosystems. Therefore, anthropocentrism is inherently human-centered, not focused on placing intrinsic value on all living organisms equally.

27. (D) Urban Heat Island effect
The scenario describes the Urban Heat Island effect, where city centers remain significantly warmer than rural areas, especially at night. Dark-colored paving materials and dense building structures have low albedo, meaning they absorb and store large amounts of solar radiation during the day. This heat is then slowly released after sunset. The lack of vegetation and moisture in urban environments further limits evaporative cooling, exacerbating the localized temperature increase compared to the nearby natural countryside.

28. (A) Decomposer - Tertiary Consumer
Trophic levels categorize organisms based on their feeding habits within an ecosystem. Producers, or autotrophs, form the base, while herbivores act as primary consumers. Carnivores that eat herbivores are secondary consumers. Decomposers occupy a unique role by breaking down dead organic matter from all levels; they are not classified as tertiary consumers, which are typically top predators in a food chain. This distinction is vital for understanding nutrient recycling and the different functional roles species play.

29. (C) An integral part of ecosystems, influencing and being influenced by them.
Human ecology promotes the view that humans are not separate from the natural world but are an integral component of ecosystems. This perspective emphasizes the two-way relationship where human societies influence environmental conditions and are, in turn, shaped by them. It studies how culture, technology, and social organization mediate these interactions. By recognizing humans as part of the ecological system, the field addresses sustainability and the

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ANSWERS

1. (B) A community of organisms interacting with non-living environmental components as a system.
An ecosystem represents a complex structural and functional unit of the biosphere. It consists of all the living organisms within a specific area interacting with the physical environment. These biotic components and abiotic factors form a singular system through energy flow and nutrient cycling. This concept emphasizes the interdependence between biological communities and non-living elements like soil, water, and sunlight to maintain ecological balance and stability.

2. (C) Statement I is correct, but Statement II is incorrect.
Human ecology examines the complex interrelationships between people and their natural, social, and built surroundings. It is an interdisciplinary field that addresses how human communities adapt to their environments and how these environments are modified by human activity. While it includes the study of pre-industrial societies, the discipline also focuses heavily on industrial and modern urban systems. This comprehensive scope makes it applicable across different historical periods.

3. (C) The position an organism occupies in a food chain.
A trophic level represents a specific stage in a food chain or ecological pyramid. It organizes organisms based on their primary source of energy and nutrition within an ecosystem. Producers form the first level, followed by primary, secondary, and tertiary consumers. Understanding these levels is crucial for tracking energy transfer efficiency. Each step up the hierarchy generally results in significant energy loss due to metabolic processes within the system.

4. (D) Unidirectional
Energy enters an ecosystem primarily through solar radiation captured by primary producers. Unlike nutrients, which cycle through the environment, energy flow is strictly one-way and non-reversible. It moves from producers to various consumer levels and finally to decomposers. At each stage, energy is lost to the environment as heat. This unidirectional movement ensures that ecosystems require a continuous external energy source, typically sunlight, to function and maintain their biological processes.

5. (C) The transfer of energy from one trophic level to another.
Geo-chemical cycles involve the continuous movement and transformation of chemical elements between the biotic and abiotic parts of the Earth. These cycles ensure that nutrients like carbon and nitrogen are recycled. In contrast, energy flow describes the one-way transfer of energy through trophic levels. Energy is eventually lost as heat and cannot be reused by the system, distinguishing it from the cyclic nature of chemical elements that remain within the biosphere.

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6. (B) Photosynthesis
Photosynthesis is the vital biological process where green plants, algae, and some bacteria convert atmospheric carbon dioxide into organic glucose. This mechanism uses sunlight as an energy source to fix carbon into the biosphere. It effectively serves as the primary gateway for carbon to enter the food web from the atmosphere. By sequestering carbon in plant tissues, this process plays a critical role in regulating global climate and supporting almost all life.

7. (D) To convert atmospheric nitrogen gas into ammonia.
Nitrogen fixation is a crucial ecological process that converts inert atmospheric nitrogen into ammonia or related nitrogenous compounds. Most living organisms cannot directly utilize nitrogen gas from the air. Specialized bacteria found in soil or within the root nodules of legumes perform this conversion. This allows nitrogen to become biologically available for plant uptake. It is the essential first step in integrating nitrogen into the broader ecosystem to support protein synthesis and growth.

37. (A) Both A and R are true and R is the correct explanation of A.
The Paris Agreement adopted a bottom-up approach to climate action, allowing each country to determine its own targets through Nationally Determined Contributions. This design was a response to the challenges faced by the Kyoto Protocol's top-down structure, which only mandated binding targets for developed nations. The previous model struggled with global participation and ratification. By allowing flexibility, the Paris Agreement achieved near-universal involvement, addressing the diverse capabilities of different nations while working toward global temperature goals.

38. (B) Achieving sustainable development at local, national, and global levels.
Agenda 21 is a comprehensive, non-binding action plan for sustainable development adopted at the 1992 Earth Summit in Rio de Janeiro. Its primary objective is to provide a global blueprint for achieving environmental sustainability at local, national, and international levels. The plan addresses social and economic dimensions, conservation and management of resources, and the role of major groups. It emphasizes that sustainable development requires integrated efforts across all sectors of society to preserve planetary resources.

39. (D) Climate Action
Sustainable Development Goal 13 specifically calls for urgent action to combat climate change and its impacts. It emphasizes the need for nations to strengthen resilience and adaptive capacity to climate-related hazards. This goal also focuses on integrating climate change measures into national policies and strategies. Furthermore, it highlights the importance of improving education and awareness regarding climate mitigation, adaptation, and early warning systems to protect vulnerable populations and ecosystems worldwide from the adverse effects of warming.

40. (A) An oil spill
Anthropogenic hazards are environmental threats or disasters caused directly by human activities or negligence. An oil spill is a classic example, typically resulting from maritime transport accidents or industrial failures. Unlike natural hazards such as volcanic eruptions, earthquakes, or tsunamis, oil spills originate from the extraction and transportation of petroleum resources. These events have devastating impacts on marine ecosystems, contaminating water sources and causing long-term harm to biological communities and coastal habitats through toxic chemical exposure.

41. (B) P-2, Q-4, R-1, S-3
Global warming is primarily driven by the increased concentration of greenhouse gases in the atmosphere. The Urban Heat Island effect results from modified land surfaces and the release of waste heat in cities. Eutrophication in water bodies is caused by excess nutrients like nitrogen and phosphorus. Land degradation is characterized by soil erosion and the loss of fertility. Understanding these relationships is essential for developing effective strategies to mitigate environmental hazards and protecting regional ecological stability.

42. (B) Part of a larger ecological system with complex interactions.
The term Human Ecology was coined to describe the study of human communities as integral components of the natural world. This perspective views human populations as part of a larger ecological system, emphasizing the complex interactions between people and their environments. It recognizes that humans both influence and are influenced by biological and physical factors. This interdisciplinary approach allows for a deeper understanding of how social structures, technology, and culture shape human adaptation to evolving environmental conditions.

43. (C) Grass → Zebra → Lion → Vulture
A food chain represents a linear sequence of organisms through which nutrients and energy are transferred. It begins with a producer, such as grass, which is consumed by a primary consumer like a zebra. A predator, such as a lion, then consumes the herbivore. Finally, scavengers or decomposers like vultures may consume the remains. This model illustrates the specific feeding hierarchy and energy flow pathway within a particular habitat, showing how energy moves from the sun through life.

44. (D) A wildfire

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86. (B) P-2, Q-4, R-1, S-3
Abiotic components include non-living factors like soil, water, and sunlight. Biotic components comprise all living organisms, such as animals that consume other life forms. Producers, typically plants, perform photosynthesis to create organic matter. Saprotrophs, like fungi, obtain nutrients by decomposing dead organic material. This classification helps ecologists understand the structural organization of ecosystems and how different elements interact to sustain the flow of energy and the recycling of essential nutrients within a biological community and geographical area.

87. (C) Statement I is incorrect, but Statement II is correct.
Land degradation is a global issue that affects diverse environments, not just arid or semi-arid regions. It involves the decline in soil quality and ecological health due to various factors. Anthropogenic activities such as deforestation, unsustainable agricultural practices, and industrial pollution are major contributors to this process. These activities lead to soil erosion, loss of biodiversity, and decreased productivity. Therefore, Statement I is false because degradation is widespread, while Statement II correctly identifies its primary causes and human influences.

88. (B) The Urban Heat Island effect
Painting roofs white and increasing tree cover are effective strategies for mitigating the Urban Heat Island effect. White surfaces have a high albedo, meaning they reflect more solar radiation instead of absorbing it as heat. Trees provide shade and cool the air through evapotranspiration. These measures help lower ambient temperatures in cities, reducing the need for air conditioning and improving public health. By modifying urban surfaces, these actions address the root causes of localized heat accumulation in metropolitan areas worldwide.

89. (C) Space Exploration
The 17 Sustainable Development Goals adopted by the United Nations cover a broad spectrum of global challenges. These include eradicating poverty, ending hunger, and promoting decent work and economic growth. Other goals focus on education, gender equality, and climate action. While space exploration is a significant field of scientific endeavor, it is not listed as one of the specific SDGs. The goals are primarily oriented toward ensuring social equity, environmental sustainability, and economic prosperity for all people on Earth by the year 2030.

90. (D) Geo-chemical cycling
Geo-chemical cycling involves the continuous movement of chemical elements between the Earth's biotic and abiotic components. The breakdown of rock through weathering and the decomposition of organic matter are essential parts of this process. These actions release inorganic nutrients like phosphorus and nitrogen back into the environment, making them available for uptake by producers. This recycling is fundamental for maintaining ecosystem productivity and ensuring that essential building blocks of life are not permanently trapped in inaccessible or organic forms.

91. (C) It sets a global goal but relies on voluntary, nationally determined contributions to achieve it.
The Paris Agreement establishes a shared global objective to limit temperature rise but utilizes a flexible framework for implementation. Unlike the Kyoto Protocol's top-down mandates, it relies on voluntary Nationally Determined Contributions from each signatory country. While countries are legally required to submit and track their NDCs, the specific emission targets themselves are not legally binding under international law. This approach encourages universal participation by allowing nations to set goals aligned with their unique economic and developmental circumstances and capabilities.

92. (A) 3 only
Ecosystems include both living organisms and the non-living physical environment. Human ecology specifically studies the reciprocal interactions between humans and their surroundings, not just a one-way impact. Furthermore, ecology encompasses the study of all systems, including artificial ones like agricultural fields. The geographic classification of ecosystems is indeed primarily based on climate and physical features, which determine the types of biomes found worldwide. Therefore, only the third statement

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eat the plants. Secondary consumers, which are carnivores, feed on the primary consumers. Finally, tertiary consumers, or top predators, occupy the highest level. This sequence correctly represents the unidirectional path of energy as it is transferred from the source through various levels of the biological community, following the laws of thermodynamic dissipation.

52. (D) The increase in the concentration of a pollutant in an organism over time.
Bioaccumulation occurs when an organism absorbs a pollutant, such as a heavy metal or pesticide, at a rate faster than it can be excreted or metabolized. Over time, the concentration of the substance within the organism's tissues increases. This process is particularly concerning in aquatic environments where persistent pollutants accumulate in fish and other wildlife. It differs from biomagnification, which describes how these concentrations increase at higher trophic levels throughout the entire food chain or web.

53. (C) The idea that humans have a moral responsibility towards the environment.
A fundamental principle of environmental ethics is the recognition that human beings possess a moral responsibility toward the natural world. This field of philosophy examines the ethical relationship between people and ecosystems, arguing that nature should be treated with respect. It often challenges the view that economic growth should always take precedence or that resources are infinite. Instead, it promotes values such as sustainability, intrinsic worth of species, and stewardship for future generations and planetary health.

54. (D) Meets present needs without compromising the ability of future generations to meet theirs.
The Brundtland Commission's report, Our Common Future, provided the landmark definition of sustainable development. It describes a form of growth that meets the needs of the current generation while ensuring that the ability of future generations to meet their own needs is not jeopardized. This concept emphasizes balancing economic advancement with environmental conservation and social equity. It serves as the foundational principle for modern environmental policy and international efforts to achieve long-term global sustainability and resource preservation.

55. (A) Industrialized nations with binding emission reduction targets.
Under the Kyoto Protocol, Annex I countries consisted primarily of industrialized nations and those with economies in transition. These countries were assigned specific, legally binding targets to reduce their greenhouse gas emissions relative to a 1990 baseline. This differentiation was based on the principle that developed nations had historically contributed the most to global warming and possessed greater financial and technological resources to address it. Developing nations were not required to meet binding targets during the initial period.

56. (B) Developed countries should bear greater responsibility due to their historical contribution to the problem.
The principle of Common But Differentiated Responsibilities acknowledges that while all nations share a duty to address environmental issues like climate change, their specific obligations should differ. Developed countries are expected to lead these efforts because they have historically emitted more greenhouse gases and have greater financial and technical capacity. This concept ensures that global environmental actions are equitable and consider the different developmental stages and historical contributions of each nation toward addressing pressing global ecological challenges today.

57. (B) Plan B is better as it attempts to integrate the human-built environment with natural ecological functions.
From a Human Ecology perspective, the goal is to create sustainable relationships between human societies and the natural environment. Plan B is superior because it incorporates green roofs, permeable pavements, and protected parks, which help maintain essential ecological functions like water filtration and temperature regulation. This integrated approach minimizes environmental degradation while providing for human needs. It acknowledges that built environments should work in harmony with, rather than replace, the underlying natural systems to ensure long-term sustainability.

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Density-independent factors are environmental influences that affect a population regardless of its size or density. Natural disasters, such as wildfires, floods, or extreme storms, are prime examples. These events can drastically reduce population numbers regardless of how many individuals were present initially. In contrast, density-dependent factors, such as competition for food, disease spread, or predation, become more significant as the population size increases, exerting greater pressure on the individuals within the specific ecosystem and community.

45. (C) There is a progressive loss of energy at each successive trophic level.
The pyramid of energy is always upright because energy transfer between trophic levels is inherently inefficient. According to the second law of thermodynamics, energy is lost as heat at each stage of the food chain. Only about ten percent of the energy from one level is available to the next. This progressive dissipation ensures that the total energy at higher levels is always less than that at the base, reflecting the productivity and fundamental physical constraints of the system.

46. (B) Phosphorus
The phosphorus cycle is unique among the major geo-chemical cycles because it lacks a significant atmospheric component. Phosphorus primarily exists in rocks and soil minerals, moving through the environment through weathering and erosion. It is absorbed by plants, enters the food web, and is eventually returned to the soil or sediments through decomposition. Because it does not form a stable gas, its movement is much slower and more localized compared to the global carbon or nitrogen cycles.

47. (C) Statement I is correct, but Statement II is incorrect.
Deep Ecology advocates for an ecocentric worldview where the entire ecosphere and its inhabitants possess intrinsic value. This philosophy rejects the human-centered perspective of traditional environmentalism. Environmental ethics is a broad field of philosophy studying the moral relationships between humans and the environment. It is not solely concerned with economic valuation but addresses the inherent rights of nature and future generations. Therefore, Statement I is accurate, while the limitation in Statement II incorrectly narrows the scope of ethics.

48. (B) Urban surfaces absorb more solar radiation.
Albedo is a measure of the reflectivity of a surface, with lower values indicating that more solar radiation is absorbed rather than reflected. In urban environments, materials like asphalt and concrete typically have a lower albedo than natural ground cover. Consequently, these surfaces absorb a greater amount of sunlight during the day, which is then re-radiated as heat. This process is a primary driver of the Urban Heat Island effect, leading to significantly higher temperatures in metropolitan areas.

49. (C) Sulfur dioxide and Nitrogen oxides.
Acid rain is a form of atmospheric pollution created when sulfur dioxide and nitrogen oxides are released into the air. These pollutants, primarily from burning fossil fuels in power plants and vehicles, react with water, oxygen, and other chemicals to form sulfuric and nitric acids. When these acidic compounds fall as precipitation, they can damage forests, aquatic life, and buildings. Managing these emissions is crucial for protecting diverse ecosystems and maintaining overall environmental and public health.

50. (B) 2 and 3
The Kyoto Protocol and the Paris Agreement are international treaties specifically designed to address climate change by regulating greenhouse gas emissions. The Kyoto Protocol set legally binding targets for developed nations, while the Paris Agreement established a universal framework involving all countries through nationally determined contributions. In contrast, the Montreal Protocol focuses on ozone-depleting substances, and the Basel Convention regulates the international movement and disposal of hazardous wastes between different countries, addressing separate environmental protection issues and goals.

51. (A) 2, 3, 4, 1
Energy flow in an ecosystem begins with primary producers, which capture solar energy through photosynthesis. This energy then moves to primary consumers, typically herbivores that

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65. (B) Increased concentration of Chlorofluorocarbons (CFCs); Effect: Depletion of the stratospheric ozone layer.
In environmental geography, a clear cause-and-effect relationship exists between the release of chlorofluorocarbons and the depletion of the stratospheric ozone layer. When CFCs reach the upper atmosphere, they break down and release chlorine atoms, which then catalyze the destruction of ozone molecules. This depletion allows more harmful ultraviolet radiation to reach the Earth's surface. This scientific understanding led to international action, such as the Montreal Protocol, to phase out the production of these damaging substances to protect life.

66. (B) Deep ecology is a branch of environmental ethics that advocates for more radical, non-anthropocentric viewpoints.
Environmental ethics is a broad discipline that examines the moral relationship between humans and the environment. Deep ecology is a specific, more radical branch within this field. It moves beyond traditional anthropocentric views, which focus on managing pollution for human benefit, and advocates for an ecocentric perspective. Deep ecology ascribes intrinsic value to all life and calls for a fundamental restructuring of society to prioritize the health and integrity of the entire ecosphere over mere human utility.

67. (D) Dead leaves → Woodlouse → Blackbird
A detritus food chain begins with dead organic matter, or detritus, rather than living plants. Decomposers and detritivores, such as fungi, bacteria, and small invertebrates like woodlice, feed on this material. These organisms are then consumed by larger predators, such as birds. This type of food chain is essential for recycling nutrients back into the ecosystem and is often dominant in environments with large amounts of accumulated organic litter, such as forest floors and soil systems.

68. (A) Those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.
The Polluter Pays Principle is a fundamental concept in environmental law stating that the entities responsible for creating pollution should pay for its management and remediation. This ensures that the costs of environmental damage are internalized by the polluter rather than being borne by society as a whole. By imposing financial responsibility, the principle encourages industries to adopt cleaner technologies and more sustainable practices to avoid the costs associated with environmental degradation, legal penalties, and public health impacts.

69. (C) Eutrophication
Eutrophication is the process where a water body becomes overly enriched with nutrients, typically from agricultural fertilizers or sewage runoff. This enrichment stimulates the rapid growth of algae and aquatic plants. As these organisms eventually die and decompose, bacteria consume large amounts of dissolved oxygen. This leads to hypoxic conditions that are fatal to fish and other aquatic life. The resulting ecological imbalance degrades water quality and significantly reduces the biodiversity within the lake ecosystem over a short period.

70. (C) 1, 2, 3, and 4
The Human Ecology framework analyzes human communities through several key variables. These include population characteristics such as size and density, which determine the scale of environmental demand. Technology represents the tools and techniques used to extract and process resources. Social organization, including governance and kinship, shapes how people coordinate their activities. Finally, the environment itself provides the physical and biological context. Together, these components illustrate the complex, reciprocal relationship between human societies and their surroundings in various historical contexts.

71. (D) Sustainable agriculture
Environmental hazards are processes or events that threaten the health of ecosystems and human well-being. Global warming, water pollution, and land degradation are all significant hazards that cause ecological damage and resource depletion. In contrast, sustainable agriculture is a beneficial practice designed to maintain soil health, conserve water, and reduce chemical inputs. It aims to provide food security while minimizing environmental impact, thus acting as a vital solution to hazards rather than being an environmental hazard itself.

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Ecology promotes the recognition of the intrinsic value of all life forms. Its goal is a profound change in consciousness and social structure that prioritizes the integrity and well-being of the entire ecosphere.

100. (D) 1, 2, 3, and 4
A national government's environmental legal framework covers a comprehensive range of activities. This includes establishing protected areas like national parks to conserve biodiversity and requiring environmental impact assessments for new developmental projects. The framework also sets and enforces emission standards for vehicles and industries to control pollution. Furthermore, it facilitates international cooperation to address transboundary issues. These various legal and policy tools work together to ensure that a nation's environment is protected, managed sustainably, and improved over time for its citizens.

101. (A) 3, 1, 4, 2
The history of international environmental policy began with the 1987 Brundtland Commission report, which defined sustainable development. This was followed by the 1992 Rio Earth Summit, where Agenda 21 was adopted. The Kyoto Protocol followed in 1997 to address greenhouse gas emissions. Most recently, the Paris Agreement entered into force in 2016. This chronological sequence shows the evolution from broad sustainability concepts to specific, universal climate treaties. Each milestone built upon previous efforts to coordinate global environmental management and protection.

102. (B) Detritivore or Decomposer
Organisms that obtain energy by consuming dead organic matter are classified as detritivores or decomposers. Decomposers, like bacteria and fungi, secrete enzymes to break down organic remains externally. Detritivores, such as earthworms and woodlice, ingest the material directly. These organisms play a vital role in ecosystems by recycling essential nutrients back into the soil and water. Without their activity, organic waste would accumulate, and primary producers would lack the necessary minerals to sustain growth, leading to a collapse of the food web.

103. (D) A food web provides a more complex and realistic model of energy flow in an ecosystem.
A food web consists of multiple interconnected food chains, representing the complex feeding relationships within an ecosystem. Unlike a linear food chain, a food web accounts for the fact that most organisms consume more than one type of prey and are eaten by several different predators. This complexity provides a more realistic and comprehensive model of how energy and matter flow through a biological community. It also illustrates the stability and resilience of ecosystems, as alternative food sources often exist.

104. (A) Stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
The United Nations Framework Convention on Climate Change (UNFCCC) serves as the primary international treaty for addressing global warming. Its fundamental objective is to stabilize the concentration of greenhouse gases in the atmosphere to prevent dangerous human-caused interference with the Earth's climate. Both the Kyoto Protocol and the Paris Agreement were negotiated under this framework to implement specific emission reduction strategies. The treaty emphasizes global cooperation, the principle of common but differentiated responsibilities, and the importance of long-term sustainable development for all nations.

105. (C) Statement I is incorrect, but Statement II is correct.
In an ecosystem, energy and nutrients behave differently. Energy flow is unidirectional and non-cyclic; it enters through producers and is lost as heat at each trophic level. Consequently, it cannot be reused by the system. In contrast, nutrient flow through geo-chemical cycles is largely cyclic. Elements like carbon, nitrogen, and phosphorus are constantly recycled between the biotic and abiotic components. This recycling allows the same atoms to be used repeatedly by different organisms, maintaining life over geological time scales.

106. (A) P-3, Q-1, R-2, S-4
Carbon dioxide is the primary driver of anthropogenic global warming due to its heat-

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79. (C) The flow of energy and matter through an ecosystem.
Trophic levels are foundational for understanding how energy and matter move through an ecosystem. Each level represents a specific link in the food chain, from primary producers to top predators. By studying these levels, ecologists can track how energy is lost at each step and how nutrients are recycled. This concept helps illustrate the functional relationships between different species and the overall productivity and carrying capacity of various natural habitats, biological communities, and specific regional environments.

80. (A) 1, 2, and 5
The Kyoto Protocol was adopted in 1997 and was based on the principle of common but differentiated responsibilities. It set binding emission targets primarily for developed nations, excluding developing countries from such mandates. The agreement established flexible mechanisms like the Clean Development Mechanism to help countries achieve their goals. Notably, the United States never ratified the protocol. Therefore, statements regarding universal binding targets and U.S. participation are incorrect, while the protocol's history and mechanisms are accurately described.

81. (B) Ecocentrism
Ecocentrism is an ethical perspective that assigns intrinsic value to the entire ecosphere, including all its living and non-living components. Unlike anthropocentrism, which prioritizes human needs, ecocentrism argues that the environment has worth independent of its utility to humanity. This viewpoint emphasizes the interdependence of all species and the importance of maintaining ecological integrity. It advocates for a fundamental shift in how humans relate to nature, promoting stewardship and the protection of biodiversity for its own sake and health.

82. (A) Agenda 21 - Framework for sustainable development
Agenda 21 is a non-binding action plan for sustainable development adopted at the 1992 Earth Summit. It provides a comprehensive framework for addressing environmental and developmental issues globally. In contrast, the Paris Agreement focuses on climate change and emissions, the Kyoto Protocol also targets greenhouse gases, and the Brundtland Commission popularized the definition of sustainable development but did not set binding CO_2 targets. Therefore, the association between Agenda 21 and its role as a sustainable development framework is correct.

83. (D) A mediating factor that shapes the way humans interact with and modify their environment.
In the field of Human Ecology, technology is viewed as a mediating factor that determines how human societies interact with their environment. It includes the tools, knowledge, and techniques used to extract resources and modify habitats. Rather than being purely destructive or a perfect solution, technology reflects social values and organization. It shapes the scale and nature of human impact on ecosystems while also providing the means for societies to adapt to changing environmental conditions and modern global challenges.

84. (B) Biomagnification
Biomagnification is the process where the concentration of persistent pollutants, such as mercury or DDT, increases as they move up the food web. Organisms at higher trophic levels consume many individuals from lower levels, accumulating the toxins stored in their prey. This results in top predators having the highest concentrations, which can lead to severe health and reproductive issues. This phenomenon highlights the long-term dangers of introducing stable, toxic chemicals into natural ecosystems and the resulting impacts on entire biological communities.

85. (C) Nutrient cycling and energy flow.
The primary functions of an ecosystem involve the continuous flow of energy and the cycling of nutrients among its biotic and abiotic components. Energy enters the system through producers and is transferred through trophic levels, while essential elements like carbon and nitrogen are recycled through decomposers. These processes maintain the system's stability and productivity. Unlike static environments, ecosystems are dynamic, characterized by constant interactions that ensure resources are redistributed to support diverse life forms within any given natural habitat.

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58. (A) 1 and 2 only
In a functioning ecosystem, energy flows in a single direction from producers to various consumers and is eventually dissipated as heat. Conversely, nutrients are cycled and reused multiple times as they move through the biotic and abiotic components. Decomposers are essential for this recycling process, breaking down organic matter to release inorganic elements. Furthermore, the ultimate source of energy for the vast majority of Earth's ecosystems is sunlight, which powers photosynthesis at the primary level.

59. (A) Both A and R are true and R is the correct explanation of A.
A food web is more stable than a simple food chain because it consists of multiple interconnected pathways for energy transfer. In a web, most organisms have various alternative food sources. If the population of one species declines, its predators can switch to other prey, preventing the entire system from collapsing. This complexity provides a buffer against environmental disturbances, ensuring that the ecosystem can maintain its functional integrity even when individual populations fluctuate due to natural or anthropogenic causes.

60. (D) The Paris Agreement
Nationally Determined Contributions are at the heart of the Paris Agreement, representing each country's self-defined efforts to reduce national emissions and adapt to the impacts of climate change. Unlike previous top-down treaties, the Paris Agreement requires all parties to submit and update these targets every five years. This bottom-up approach encourages universal participation and allows countries to set goals that reflect their specific economic circumstances, technological capabilities, and national developmental priorities while contributing to global climate objectives.

61. (B) To conserve environmental resources while ensuring livelihood security.
India's National Environmental Policy of 2006 aims to balance environmental conservation with the need for sustainable economic development and livelihood security. It recognizes that poverty is a major driver of environmental degradation and that protecting natural resources is essential for the well-being of the population. The policy emphasizes the integration of environmental concerns into all developmental activities and encourages public participation and partnerships between the government, private sector, and civil society for effective and holistic resource management.

62. (D) Trophic ecosystems (defined by energy levels).
Geographic classification of ecosystems is based on their physical environment and dominant climatic conditions. This includes terrestrial biomes like forests and deserts, aquatic systems such as oceans and rivers, and even human-modified artificial ecosystems like croplands. In contrast, trophic levels or trophic categories describe the functional role of organisms based on energy transfer within any given ecosystem. They are not a geographic classification themselves but rather a way to analyze an ecosystem's internal structure and energetic efficiency.

63. (C) The carbon cycle operates independently of the oxygen and water cycles.
The carbon cycle is deeply interconnected with other biogeochemical cycles, including the oxygen and water cycles. For example, photosynthesis involves the consumption of carbon dioxide and the release of oxygen, while the movement of carbon often depends on its solubility in water. Burning fossil fuels and deforestation significantly disrupt this cycle by increasing atmospheric carbon levels. Oceans also serve as a vital carbon sink, illustrating the complex interactions between different biological and physical components of the Earth's system.

64. (C) P-4, Q-2, R-1, S-3
Sustainable Development Goal 6 focuses on clean water and sanitation for all. Goal 7 aims to ensure access to affordable and clean energy. Goal 14 is dedicated to the conservation of life below water, specifically marine and coastal ecosystems. Goal 15 addresses life on land, emphasizing the protection of terrestrial environments and biodiversity. Together, these goals represent a comprehensive framework for addressing diverse environmental challenges within the context of global sustainable development efforts by the United Nations.

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correctly reflects established ecological principles and methodologies used in geography.

93. (A) Both A and R are true and R is the correct explanation of A.
The Sustainable Development Goals represent a significant shift from the previous Millennium Development Goals. While the MDGs were primarily focused on social targets in developing nations, the SDGs are universal and apply to all countries regardless of their wealth. The SDGs also integrate economic, social, and environmental dimensions into a single, cohesive agenda. This comprehensive approach recognizes that issues like climate change and inequality are interconnected and require coordinated global action to achieve long-term sustainability and prosperity for all.

94. (D) Numbers, biomass, and energy at successive trophic levels.
Ecological pyramids are graphical tools designed to illustrate the relationships between different trophic levels in an ecosystem. They can represent the total number of individual organisms, the total amount of biomass, or the flow of energy at each stage. Typically, these pyramids show a decrease in these values from the producers at the base to the top predators. This visual model helps scientists analyze the efficiency of energy transfer and the overall structural organization and health of biological communities and ecosystems.

95. (A) Ammonification
Ammonification is a crucial step in the nitrogen cycle where decomposers, such as bacteria and fungi, break down nitrogenous organic matter. This includes dead plants, animals, and waste products like urea. Through this process, organic nitrogen is converted back into inorganic ammonia or ammonium ions. This makes nitrogen available in the soil for further transformation by nitrifying bacteria. It is an essential recycling mechanism that prevents nitrogen from remaining locked in dead tissue, supporting continued primary productivity in ecosystems.

96. (B) The Brundtland Commission report 'Our Common Future'
Among the listed initiatives, the Brundtland Commission's report, titled Our Common Future, was the earliest, published in 1987. This landmark document introduced the concept of sustainable development to a global audience. The Kyoto Protocol followed later in 1997, and both the Paris Agreement and the Sustainable Development Goals were adopted much more recently, in 2015. The commission's work laid the essential foundation for subsequent international treaties and frameworks aimed at balancing economic growth with environmental protection on a global scale.

97. (B) The relationship between social organization, technology, and the environment.
In Human Ecology, the transition from hunting and gathering to agriculture marks a fundamental change in how societies interact with the environment. This shift involved new social structures, advanced technologies for land cultivation, and a more sedentary lifestyle. It allowed for larger populations and significant modification of natural landscapes. This change represents an evolution in the human ecological niche, where people began to actively manage and transform ecosystems to meet their needs, rather than solely relying on wild resource extraction.

98. (A) A violation of water pollution regulations.
Discharging untreated industrial waste into a river is a direct violation of environmental laws designed to prevent water pollution. Such actions introduce harmful chemicals and pathogens into aquatic systems, which can be toxic to wildlife and dangerous for human consumption. Legal frameworks establish specific standards for effluent treatment to protect water quality and public health. Companies found engaging in these practices are typically subject to fines, legal penalties, and requirements to remediate the damage they have caused to ecosystems.

99. (C) To foster a fundamental shift in consciousness from anthropocentrism to ecocentrism.
Deep Ecology aims to transform the human relationship with the natural world by advocating for a shift from anthropocentrism to ecocentrism. This philosophy argues that mainstream environmentalism is too shallow because it only addresses the symptoms of ecological crisis, like pollution, for human benefit. Instead, Deep

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72. (B) Inverted
In some aquatic ecosystems like ponds, the pyramid of biomass can be inverted. This occurs because the primary producers, such as phytoplankton, have a very high turnover rate and small standing crop compared to the consumers. Although they produce enough energy to support the higher levels, their total mass at any single point in time is less than the mass of the zooplankton and fish that feed on them. This creates a top-heavy biomass structure within that specific ecosystem.

73. (C) Statement I is correct, but Statement II is incorrect.
The Paris Agreement achieved a milestone by requiring all signatory nations, regardless of their developmental status, to submit Nationally Determined Contributions for climate action. This created a universal framework for reducing emissions. Conversely, the Kyoto Protocol followed a different model, imposing legally binding emission reduction targets only on developed countries, known as Annex I parties. Developing nations were encouraged to participate through flexible mechanisms but did not have binding targets. Therefore, the second statement correctly identifies the protocol's limitation.

74. (D) Facilitate the movement of oxygen through the atmosphere, biosphere, and lithosphere.
The oxygen cycle describes the continuous movement of oxygen through the Earth's atmosphere, biosphere, and lithosphere. It ensures that oxygen is available for vital biological processes like aerobic respiration while also participating in the formation of ozone and the weathering of rocks. By cycling oxygen between living organisms and the inorganic environment, the cycle maintains stable atmospheric levels of oxygen. This regulation is fundamental for supporting life and various chemical reactions necessary for maintaining global planetary stability.

75. (A) 3, 4, 1, 2
The nitrogen cycle begins with nitrogen fixation, where atmospheric nitrogen is converted into usable forms by bacteria or lightning. After being incorporated into living organisms, ammonification occurs as decomposers break down organic matter into ammonia. Nitrification follows, with specific bacteria converting ammonia into nitrites and then nitrates. Finally, denitrification returns nitrogen to the atmosphere when other bacteria convert nitrates back into nitrogen gas. This sequence ensures the continuous recycling of nitrogen throughout the entire ecosystem for biological use.

76. (A) Both A and R are true and R is the correct explanation of A.
The Urban Heat Island effect is frequently more pronounced at night because urban materials like concrete and asphalt have high thermal inertia. These surfaces absorb significant solar energy during the day and release it slowly after sunset. In contrast, rural areas with more vegetation cool down much faster due to evapotranspiration and less heat storage. This slow release of stored heat in cities keeps nighttime temperatures elevated, creating a distinct temperature difference between urban and natural rural environments.

77. (D) Evaluate the likely environmental impacts of a proposed project before a decision is made to proceed.
An Environmental Impact Assessment is a systematic process used to identify and evaluate the potential environmental consequences of a proposed development project. By conducting this assessment before a final decision is made, policymakers can incorporate mitigation strategies or choose more sustainable alternatives. It serves as a proactive planning tool within a nation's legal framework to prevent unnecessary ecological damage. This ensures that economic development does not come at an unacceptable cost to natural resources and public health.

78. (B) Strengthening of the ozone layer.
Global warming is characterized by a rise in the Earth's average surface temperature, leading to several direct environmental consequences. These include the melting of glaciers and polar ice sheets, which contributes to rising sea levels. It also increases the frequency and intensity of extreme weather events like heatwaves and storms. However, the depletion or strengthening of the ozone layer is a separate phenomenon related to chemical pollutants like chlorofluorocarbons, not directly caused by global warming or greenhouse gas concentration.

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trapping properties. Sulfur dioxide reacts with atmospheric moisture to form acid rain, which damages ecosystems and infrastructure. Chlorofluorocarbons (CFCs) are well-known for depleting the stratospheric ozone layer, increasing ultraviolet radiation exposure. Excess nutrients like nitrates and phosphates cause eutrophication in water bodies, leading to algal blooms and oxygen depletion. Understanding these specific pollutant-hazard associations is crucial for developing targeted environmental regulations and mitigation strategies.

107. (D) Urban Heat Island effect and increased surface runoff leading to water pollution.
Replacing natural vegetation with impermeable surfaces like asphalt and concrete significantly alters the local environment. These materials absorb and retain heat, primarily driving the Urban Heat Island effect. Furthermore, they prevent rainwater from infiltrating the soil, leading to increased surface runoff during storms. This runoff often carries urban pollutants into nearby water bodies, contributing to water pollution. These two interconnected issues highlight how urban development can simultaneously modify local climates and degrade water quality if not managed sustainably.

108. (B) Trophic Levels - Defined by the species' geographic range.
Trophic levels describe the functional position of organisms within a food web based on their energy source. They are categorized as producers, primary consumers, and so on. This classification is independent of a species' geographic range, which refers to the spatial area where a population can be found. In contrast, geographic classification of ecosystems uses biomes and physical features. Human ecology focuses on people as part of ecosystems, and ecosystem functions include energy flow and nutrient cycling. These associations are all fundamentally correct.

109. (C) In large predatory birds that eat the fish (tertiary or quaternary consumers).
Biomagnification occurs when persistent pollutants like DDT increase in concentration at each successive trophic level. While producers like phytoplankton absorb small amounts from the water, each consumer level eats many organisms from the level below. This leads to a significant accumulation of the toxin in the tissues of top predators. Large predatory birds, occupying the highest trophic levels, will consequently have the highest concentrations. This phenomenon can cause severe health and reproductive problems, as historically seen with the decline of certain bird populations.

110. (B) 1 and 2
The Brundtland Commission, formally known as the World Commission on Environment and Development, was established by the United Nations in 1983. Its primary mission was to address growing concerns about the accelerating deterioration of the human environment and natural resources. Its landmark 1987 report, Our Common Future, defined and popularized the concept of sustainable development. Importantly, the commission argued that economic development and environmental protection are compatible and must be integrated to ensure the well-being of future generations across the entire globe.

111. (C) A is true but R is false.
Nitrogen is an essential building block for life, as it is a key component of proteins and nucleic acids like DNA. However, most organisms cannot directly utilize the abundant nitrogen gas (N_2) found in the atmosphere because its strong triple bond is difficult to break. It must first be fixed into usable forms like ammonia or nitrates through biological or industrial processes. Therefore, while nitrogen is crucial, the vast majority of life depends on nitrogen fixation by bacteria to access this vital element.

112. (B) Land Degradation
Salinization is a process where salts accumulate in the soil, often due to improper irrigation practices in arid and semi-arid regions. This accumulation inhibits plant growth and reduces agricultural productivity, making it a significant form of land degradation. When the salt concentration becomes too high, it can lead to the complete loss of soil fertility and desertification. Addressing salinization requires improved water management and soil drainage to prevent the long-term deterioration of productive land and maintain local food security.

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change. Agenda 21 was adopted first at the 1992 Rio Earth Summit. This was followed by the Kyoto Protocol in 1997, which introduced legally binding emission targets for developed countries. Finally, the Paris Agreement was adopted in 2015, establishing a universal framework for climate action involving all nations. This sequence illustrates the transition from broad action plans to specific, globally inclusive treaties aimed at mitigating environmental degradation.

127. (D) Brundtland Commission - Popularized the term 'Sustainable Development'.
The Brundtland Commission, formally the World Commission on Environment and Development, is widely credited with popularizing the concept of sustainable development in its 1987 report, Our Common Future. This document provided the influential definition of meeting present needs without compromising future ones. In contrast, Human Ecology includes social aspects, Deep Ecology is not about shallow management, and the Kyoto Protocol was based on binding targets for developed nations. Therefore, the association between the Brundtland Commission and the popularization of sustainable development is the only correct pair.

128. (B) To transfer energy from producers to secondary consumers.
Herbivorous animals, also known as primary consumers, play a vital role in an ecosystem's energy flow. They feed directly on primary producers, such as plants and algae, converting the chemical energy stored in plant biomass into animal biomass. This energy then becomes available to secondary consumers, or carnivores, that prey on the herbivores. By acting as a link between producers and higher-level consumers, herbivores facilitate the transfer of energy through the food chain, ensuring that nutrients and energy are distributed within the community.

129. (C) The law of increasing entropy, which dictates energy loss as heat in transfers (Second Law).
The second law of thermodynamics, or the law of increasing entropy, explains why ecological pyramids of energy are always upright. This physical principle states that whenever energy is transformed or transferred, some portion is inevitably lost as heat. In an ecosystem, this means that only a small fraction of energy from one trophic level is available to the next higher level. This continuous dissipation ensures that the total usable energy decreases at each stage, limiting the number of trophic levels and the system's overall productivity.

130. (D) It involves the movement and transformation of elements through biotic and abiotic components of the Earth.
A geo-chemical cycle represents the continuous movement and transformation of chemical elements, such as carbon, nitrogen, and phosphorus, through the Earth's biological and physical components. These cycles involve both living organisms and the inorganic environment, including the atmosphere, oceans, and soil. Unlike the unidirectional flow of energy, these cycles ensure that essential elements are recycled and reused repeatedly over geological time. This recycling is fundamental for sustaining life and maintaining the long-term chemical balance of the planet's diverse and interconnected ecosystems.

131. (B) 2 and 4
The Urban Heat Island effect is a localized phenomenon where metropolitan areas experience higher temperatures than their rural surroundings due to human activities and modified land surfaces. Eutrophication is a form of water pollution caused by the enrichment of nutrients, often from agricultural runoff, leading to oxygen depletion. In contrast, Deep Ecology promotes an ecocentric, not anthropocentric, worldview. Furthermore, land degradation is driven by both natural processes and significant human activities like deforestation. Therefore, only statements 2 and 4 accurately describe these environmental concepts.

132. (A) Both A and R are true and R is the correct explanation of A.
International environmental agreements are essential for addressing transboundary issues like global warming because emissions from any single country contribute to a global problem. Greenhouse gases disperse in the atmosphere and affect the global climate, regardless of their origin. Therefore, national actions alone are insufficient to mitigate the impacts of climate change. Cooperative international frameworks are necessary to coordinate reduction efforts,

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growth and human convenience over ecological preservation. While it can support conservation for the sake of future human generations, it does not recognize the intrinsic worth of non-human species or ecosystems independent of their service to humanity.

120. (A) Trophic Level Cycle
Geo-chemical cycles describe the continuous movement of chemical elements through the Earth's atmosphere, hydrosphere, lithosphere, and biosphere. Examples include the carbon, nitrogen, and oxygen cycles, which involve the transformation and recycling of matter between living and non-living components. In contrast, trophic levels represent the hierarchical stages of energy flow in a food chain. Energy flow is unidirectional and non-cyclic, meaning it is eventually dissipated as heat and cannot be recycled through the system like chemical elements in a geo-chemical cycle.

121. (B) Access to affordable, reliable, sustainable and modern energy for all.
Sustainable Development Goal 7 aims to ensure universal access to affordable, reliable, sustainable, and modern energy. This goal recognizes that energy is essential for almost every major challenge and opportunity the world faces today, including poverty eradication, education, and health. It emphasizes the need for increasing the share of renewable energy in the global mix and improving energy efficiency worldwide. Achieving this goal is critical for mitigating climate change and promoting inclusive economic growth while protecting the environment for future generations.

122. (A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
The Urban Heat Island effect occurs because cities absorb and retain more heat than natural environments. Construction materials like asphalt and concrete have low albedo and high thermal mass, causing them to store significant solar energy. This leads to higher ambient temperatures in urban areas compared to surrounding rural regions. Consequently, cities often experience increased demand for air conditioning to maintain indoor comfort. This higher energy consumption for cooling can further exacerbate the heat island effect through the release of waste heat from cooling systems.

123. (D) Biome
A biome is a large-scale ecosystem geographically classified primarily by its prevailing climatic conditions, such as temperature and precipitation. These factors determine the dominant types of vegetation and animal communities that characterize the region. Examples include tropical rainforests, deserts, and tundras. Biomes provide a broad framework for understanding the global distribution of life and how different species have adapted to specific environmental challenges. They differ from niches or populations, which describe smaller-scale ecological roles and groups of a single species.

124. (D) Mutualism
Mutualism is a type of symbiotic interaction where both participating organisms benefit from the relationship. A classic example is found in lichens, which consist of a fungus and an alga living together. The alga provides organic nutrients through photosynthesis, while the fungus offers structural support, protection, and absorbs water and minerals from the environment. This cooperative partnership allows lichens to survive in harsh environments where neither organism could thrive alone, demonstrating the importance of mutualistic interactions in sustaining diverse life forms.

125. (C) Formation of acid rain and smog
Atmospheric pollution results from the release of harmful substances like sulfur dioxide, nitrogen oxides, and particulate matter into the air. These pollutants can lead to the formation of acid rain when they react with water vapor. Additionally, they contribute to the development of photochemical smog, which reduces visibility and harms human health. These consequences demonstrate the direct and significant impact of air pollution on both the natural environment and urban populations, necessitating strict emission controls and sustainable industrial and transportation practices.

126. (B) 2, 3, 1
The chronological order of these international environmental initiatives reflects the evolving global response to sustainability and climate

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The deer, a herbivore that eats the grass, is the primary consumer at the second level (T2). The tiger, a carnivore that preys on the deer, is the secondary consumer at the third level (T3). This hierarchy illustrates how energy and nutrients move from producers through successive stages of consumers within a specific terrestrial ecosystem.

153. (A) 1, 2, and 4
In an ecosystem, energy flow is unidirectional, entering through producers and being lost as heat at each trophic level. Nutrients, however, are constantly cycled between biotic and abiotic components, ensuring their reuse. A food web is composed of many interconnected food chains, providing a more realistic model of feeding relationships. Importantly, while pyramids of numbers or biomass can sometimes be inverted, the pyramid of energy is always upright because energy is inevitably lost at each stage of transfer, according to thermodynamic principles.

154. (D) The rapid oxidation of organic materials, releasing large amounts of CO_2 into the atmosphere.
Combustion is a significant process in the carbon cycle that involves the rapid chemical reaction of organic materials with oxygen, releasing energy as heat and light. This process converts carbon stored in biomass or fossil fuels into gaseous carbon dioxide, which is then released into the atmosphere. While natural events like wildfires contribute to this, the large-scale burning of fossil fuels for energy and industry has significantly increased atmospheric CO_2 levels. This rapid release of stored carbon disrupts the natural balance of the cycle and contributes to global warming.

155. (C) Denitrification
Denitrification is a vital biological process in the nitrogen cycle that converts nitrates back into gaseous nitrogen. This transformation is performed by specialized anaerobic bacteria, typically in oxygen-poor environments like waterlogged soils or sediments. By releasing nitrogen gas back into the atmosphere, denitrification completes the cycle and prevents the excessive accumulation of nitrates in ecosystems. This process is essential for maintaining the balance of nitrogen on Earth and regulating the composition of the atmosphere, ensuring that nitrogen remains available for continued biological use through subsequent fixation.

156. (B) Biocentrism
Biocentrism is an ethical perspective that extends moral standing to all living beings, regardless of their utility to human beings. This viewpoint argues that all forms of life have inherent worth and a right to exist. Biocentrism challenges anthropocentrism, which prioritizes human needs, and encourages humans to consider the impact of their actions on other species and the broader natural world. This ethical framework supports the protection of biodiversity and the conservation of ecosystems based on the intrinsic value of life itself, promoting a more respectful and responsible human relationship with nature.

157. (A) Both Statement I and Statement II are correct, and Statement II is the correct explanation of Statement I.
The Urban Heat Island (UHI) effect, characterized by higher temperatures in cities, can lead to increased concentrations of ground-level ozone. Ground-level ozone is not emitted directly but forms through chemical reactions between nitrogen oxides and volatile organic compounds in the presence of sunlight. These reactions are temperature-dependent and occur more rapidly at higher temperatures. Therefore, the elevated temperatures associated with UHIs accelerate the formation of ozone and smog, worsening air quality and posing significant health risks to urban populations during periods of intense solar radiation and high heat.

158. (D) Soil erosion
Soil erosion is the physical removal of the topsoil by natural forces such as wind and water, or by human activities like deforestation and unsustainable farming. Because the topsoil contains the highest concentration of organic matter and essential nutrients, its loss significantly reduces soil fertility and agricultural productivity. Over time, severe erosion can lead to land degradation and even desertification in vulnerable areas. Managing soil erosion through practices like planting cover crops and contour plowing is essential for maintaining productive

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share technologies, and ensure that all nations contribute fairly to protecting the shared global environment and achieving long-term climate stability.

133. (C) Specialized judicial body for the effective and expeditious disposal of cases relating to environmental protection.
The National Green Tribunal in India is a specialized judicial body established under the NGT Act of 2010. Its primary purpose is to provide for the effective and speedy disposal of cases relating to environmental protection and conservation of forests and other natural resources. It has the authority to hear appeals and provide relief and compensation for damages to persons and property. The NGT plays a crucial role in enforcing environmental laws and ensuring that ecological disputes are handled by experts in the field.

134. (D) The collective processes like energy flow and nutrient cycling that characterize the system.
Ecosystem functions refer to the dynamic and collective processes that occur within an ecological system to maintain its stability and productivity. These primarily include the flow of energy through various trophic levels and the cycling of essential nutrients like carbon and nitrogen between biotic and abiotic components. These functions represent the system in action, rather than just its static physical components or species list. Understanding these processes is vital for assessing ecosystem health, resilience to disturbances, and the overall sustainability of natural and human-modified environments.

135. (A) A complex network of interconnected food chains showing multiple feeding relationships.
A food web is a comprehensive model that illustrates the complex and interconnected feeding relationships within an ecosystem. Unlike a simple, linear food chain, it accounts for the fact that most organisms consume multiple types of prey and are themselves eaten by various predators. This network of interactions provides a more realistic representation of how energy and matter move through a biological community. The complexity of a food web also contributes to ecosystem stability by offering alternative pathways for energy transfer if specific populations fluctuate.

136. (B) Increased soil biodiversity and fertility.
Land degradation is characterized by the deterioration of soil quality and the loss of its productive capacity. This process typically leads to reduced agricultural productivity, soil erosion, and the loss of biodiversity. In arid regions, it can result in desertification, while in other areas, it may increase the risk of natural disasters like flooding and landslides. Therefore, land degradation is fundamentally associated with a decline in ecological health and resource availability, rather than any increase in soil biodiversity, fertility, or general ecosystem resilience.

137. (B) The Millennium Development Goals (MDGs)
The 2030 Agenda for Sustainable Development, which features the 17 Sustainable Development Goals, succeeded the Millennium Development Goals that were in place from 2000 to 2015. While the MDGs primarily targeted social issues in developing countries, the SDGs are universal and apply to all nations regardless of their wealth. The SDGs also represent a more integrated approach, simultaneously addressing the economic, social, and environmental dimensions of sustainable development. This transition reflects a more comprehensive global strategy to tackle interconnected challenges like poverty and climate change.

138. (A) P-4, Q-1, R-2, S-3
The Kyoto Protocol is known for setting binding emission targets specifically for developed nations, or Annex I countries. The Paris Agreement introduced the system of Nationally Determined Contributions (NDCs) for all participating countries. Agenda 21 provides a comprehensive, non-binding action plan for achieving sustainable development at various levels. The Brundtland Commission played a pivotal role by defining and popularizing the concept of sustainable development in its report. Matching these initiatives with their key features highlights the evolution of international environmental governance and cooperation.

139. (C) Typically adopts an anthropocentric perspective, focusing on environmental problems as they affect humans.
Shallow environmentalism is characterized by its anthropocentric perspective, where

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113. (C) provided a non-binding action plan for sustainable development.
Agenda 21 was adopted at the 1992 Earth Summit in Rio de Janeiro as a non-binding action plan for sustainable development. It provided a comprehensive blueprint for global, national, and local actions to be taken by governments and organizations. The document addressed diverse challenges, including poverty, resource management, and social equity. While not a legally binding treaty, it set a significant precedent for international environmental policy and encouraged nations to integrate sustainability into their developmental strategies throughout the twenty-first century.

114. (D) requires all parties to put forward their best efforts through "Nationally Determined Contributions" (NDCs).
A key difference between the Paris Agreement and the Kyoto Protocol is the shift from top-down mandates to a bottom-up approach. The Kyoto Protocol set legally binding targets only for developed nations. In contrast, the Paris Agreement requires all participating countries, both developed and developing, to submit and regularly update their own climate targets through Nationally Determined Contributions (NDCs). This universal participation recognizes that climate change is a global problem requiring collective action while allowing flexibility for each country's specific national circumstances.

115. (A) An increase in urban development, leading to more impermeable surfaces.
From a Human Ecology perspective, the increase in urban flash flooding is likely caused by the replacement of natural vegetation with impermeable surfaces like concrete and asphalt. These materials prevent rainwater from soaking into the ground, leading to rapid surface runoff. In natural environments, plants and soil slow down and absorb much of the rainfall. As cities expand, the loss of these natural sinks causes drainage systems to be overwhelmed more quickly, leading to frequent flooding even when the rainfall intensity remains relatively unchanged.

116. (B) 2, 3, and 4
Global warming is primarily caused by the enhanced greenhouse effect due to anthropogenic emissions of gases like carbon dioxide and methane. It leads to the thermal expansion of oceans and the melting of land-based ice, both contributing to sea-level rise. While carbon dioxide is most abundant, methane is significantly more potent per molecule as a heat-trapping gas. It is important to distinguish this from ozone layer depletion, which is a separate phenomenon. Furthermore, global warming is expected to increase the frequency of extreme weather events.

117. (B) Producers
Producers, also known as autotrophs, form the base of every ecological pyramid, whether it represents numbers, biomass, or energy. These organisms, primarily green plants and algae, capture energy from the sun through photosynthesis to create organic matter. Because energy is lost at each successive trophic level, the base must support all higher levels of consumers. This fundamental structure reflects the unidirectional flow of energy and the hierarchical organization of life within any ecosystem, ensuring that energy is available for all organisms.

118. (B) Provide a basis for regulating activities that impact the environment and to enforce compliance.
The primary purpose of an environmental legal framework is to provide a comprehensive basis for regulating human activities that impact natural resources and public health. It codifies standards for pollution control, resource management, and conservation. By establishing these rules, the government can monitor compliance and enforce penalties for violations. This legal structure ensures that developmental activities are conducted in a manner that protects the environment, maintains ecological balance, and provides a sustainable future for all citizens within the country.

119. (D) Anthropocentrism
Anthropocentrism is a human-centered ethical perspective that views the natural world primarily as a resource for human benefit. From this viewpoint, only human beings possess inherent moral standing, and the environment's value is determined by its utility to people. This perspective often prioritizes economic

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10% rule states that only a small portion of energy is transferred, not created, at each level.

146. (B) To protect, restore and promote sustainable use of terrestrial ecosystems and halt biodiversity loss.
Sustainable Development Goal 15 focuses on life on land, with the central aim of protecting, restoring, and promoting the sustainable use of terrestrial ecosystems. It emphasizes the need for sustainable forest management, combating desertification, and halting and reversing land degradation. A key component of this goal is to stop biodiversity loss by protecting endangered species and their habitats. Achieving SDG 15 is essential for maintaining the ecological services that support human life and ensuring the long-term health and productivity of the planet's diverse land-based environments.

147. (D) Acid rain
High levels of sulfur dioxide (SO_2) and nitrogen oxides (NOx) in the atmosphere are the primary causes of acid rain. These gases, often from industrial emissions and vehicle exhaust, react with atmospheric water vapor and oxygen to form sulfuric and nitric acids. When these acidic compounds fall as precipitation, they can significantly lower the pH of lakes and soil, damaging forests, aquatic life, and even stone buildings. This regional environmental hazard highlights the far-reaching impacts of air pollution on both natural ecosystems and the built environment.

148. (A) A law mandating catalytic converters in automobiles to reduce emissions.
A law mandating the use of catalytic converters in vehicles is a clear example of a policy measure within a national environmental legal framework. Such regulations are established by the government to set and enforce emission standards, aiming to reduce atmospheric pollution and protect public health. This mandatory requirement applies to all relevant manufacturers or owners, ensuring broad compliance through the legal system. In contrast, voluntary company decisions or neighborhood initiatives lack the formal legal authority and enforcement mechanisms characteristic of a national regulatory framework for environmental protection.

149. (C) Does not take into account the size of the organisms at each level.
A primary criticism of the pyramid of numbers is that it treats all individual organisms as equal, regardless of their physical size or metabolic rate. For example, a single large tree is counted the same as a tiny blade of grass. This can lead to inverted pyramids in forest ecosystems where one producer supports many small consumers. Consequently, a pyramid of numbers may not accurately reflect the actual distribution of biological material or energy flow, making the pyramids of biomass or energy more useful for representing ecosystem structure.

150. (A) Both A and R are true and R is the correct explanation of A.
The Paris Agreement achieved universal participation by allowing each country to determine its own climate targets through Nationally Determined Contributions (NDCs). This flexible, bottom-up approach was designed to overcome the limitations of the Kyoto Protocol, which imposed binding targets only on developed nations. By permitting countries to set goals aligned with their specific economic and developmental capacities, the Paris Agreement encouraged widespread commitment from both developed and developing nations. This inclusive model is essential for addressing climate change as a shared global challenge requiring collective action and cooperation.

151. (B) Aquatic Marine Ecosystem
The pelagic zone refers to the open water of the ocean, away from the shore and the sea floor. An ecosystem geographically classified as pelagic belongs to the major category of aquatic marine ecosystems. These systems are characterized by high salinity and include various organisms such as plankton, fish, and marine mammals that live in the water column. Understanding the dynamics of pelagic ecosystems is crucial for marine biology and global climate studies, as they play a significant role in carbon sequestration and maintaining the health of the world's oceans.

152. (A) T3 (Secondary Consumer)
In the food chain Grass to Deer to Tiger, organisms are organized into trophic levels based on their feeding relationships. Grass, being the primary producer, occupies the first level (T1).

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environmental issues are primarily addressed as they relate to human health, well-being, and economic prosperity. It often seeks to manage pollution and resource depletion within existing political and social structures without questioning fundamental human-centered values. In contrast, Deep Ecology advocates for an ecocentric worldview, ascribing intrinsic value to all life forms and calling for radical changes in how societies interact with the natural world. This distinction highlights the different philosophical approaches to environmental protection and sustainability.

140. (A) Photosynthesis by plants and algae
Photosynthesis is the primary process responsible for returning oxygen to the Earth's atmosphere. During this biological mechanism, green plants, algae, and some bacteria use solar energy to convert carbon dioxide and water into glucose. Oxygen is released as a vital byproduct of this reaction. This continuous production is essential for maintaining atmospheric oxygen levels, which support aerobic respiration in almost all animals and many other organisms. Without photosynthesis, the planet's supply of oxygen would be eventually depleted, making life as we know it impossible.

141. (D) Both the biotic (living) and abiotic (non-living) components and their interactions.
An ecosystem encompasses all the living organisms, or biotic components, within a specific area, along with the non-living, or abiotic, physical environment. It includes the complex interactions between these elements, such as the flow of energy from the sun through food chains and the cycling of nutrients like nitrogen and carbon. This systems-based perspective recognizes that biological communities cannot be separated from their physical surroundings, such as climate, soil, and water. Together, these components function as a single unit to maintain ecological balance and stability.

142. (B) Biocentrism or Ecocentrism
Biocentrism and ecocentrism are non-anthropocentric ethical viewpoints that ascribe intrinsic value to the natural world. Biocentrism focuses on the inherent right of all individual living organisms to exist, while ecocentrism emphasizes the value of entire ecosystems and the ecosphere as a whole. Both perspectives argue that nature should be protected for its own sake, regardless of its usefulness or utility to human beings. This contrasts with anthropocentrism, which views the environment solely as a resource to be managed for human benefit and economic gain.

143. (C) Statement I is correct, but Statement II is incorrect.
Global warming is primarily caused by the enhanced greenhouse effect, where increased concentrations of gases like carbon dioxide trap outgoing infrared radiation in the atmosphere. This process leads to a rise in the Earth's average surface temperature. While natural sources like volcanic activity do release carbon dioxide, they contribute only a small fraction compared to human activities. The primary cause of the recent and rapid increase in atmospheric CO_2 is the burning of fossil fuels and large-scale deforestation, making human impact the dominant factor in current climate trends.

144. (B) Determine how a human group adapts to and modifies its environment.
In the field of Human Ecology, social organization, technology, and population are identified as key variables that shape the relationship between humans and their environment. Population size and density determine the scale of environmental demand. Technology provides the tools and techniques used to extract resources and modify habitats. Social organization, including governance and kinship systems, influences how a group coordinates these activities. Together, these factors mediate how human communities adapt to their surroundings and the extent of their impact on natural ecological systems and processes.

145. (B) 3 and 4
Geo-chemical cycles, such as the nitrogen cycle, involve the continuous movement and transformation of matter between the biotic and abiotic parts of an ecosystem. Ecological pyramids are effective graphical tools used to represent the total numbers, biomass, or energy at different trophic levels. In contrast, producers do not create energy; they capture solar energy. Energy flow is unidirectional, and a food web is typically more stable than a food chain. Furthermore, the

land and ensuring long-term food security and ecosystem health.

159. (A) The protection and improvement of the environment.
The Environment Protection Act of 1986 is a foundational piece of legislation in India designed to protect and improve the quality of the environment. It provides a comprehensive framework for coordinating the activities of various central and state authorities established under earlier laws. The act empowers the central government to set national standards for environmental quality, regulate industrial activities, and take measures to prevent and control pollution. This legislative tool is crucial for ensuring that developmental activities are balanced with the need to conserve natural resources and protect public health throughout the country.

160. (B) Our Common Future
The Brundtland Commission report, formally published in 1987 by the World Commission on Environment and Development, is officially titled Our Common Future. This landmark document is most famous for defining and popularizing the concept of sustainable development, emphasizing the need to balance economic growth, social equity, and environmental protection. It argued that these three dimensions are interconnected and must be addressed simultaneously to ensure a better future for all people. The report laid the essential foundation for subsequent international agreements and global efforts toward achieving environmental sustainability.

161. (B) For each country to formulate and communicate its Nationally Determined Contributions (NDCs).
A central commitment of the Paris Agreement is for each signatory country to formulate, communicate, and regularly update its own climate action targets, known as Nationally Determined Contributions (NDCs). This flexible, bottom-up approach allows countries to set goals that reflect their specific national circumstances and capabilities. While the targets themselves are not legally binding under international law, the agreement requires transparency and regular reporting on progress. This universal framework encourages all nations to contribute to the global effort to limit temperature rise and strengthen resilience against the impacts of climate change.

162. (A) 2, 4, 3, 1
In a typical grazing food chain, organisms are organized by their trophic levels. Grass serves as the primary producer at the base (T1). The grasshopper, which feeds on the grass, is the primary consumer at the second level (T2). The snake, a predator of the grasshopper, occupies the third level as a secondary consumer (T3). Finally, the hawk, which preys on the snake, is the tertiary consumer at the fourth level (T4). This sequence correctly represents the flow of energy from producers through successive stages of consumers in an ecosystem.

163. (C) Increased soil erosion and loss of biodiversity
Large-scale deforestation serves as a primary cause with several significant environmental effects. Without the protective canopy and root systems of trees, the soil becomes highly vulnerable to erosion by wind and water, leading to land degradation. Furthermore, removing forests destroys the habitats of countless species, resulting in a profound loss of biodiversity. These impacts also disrupt local hydrological cycles and reduce the ecosystem's ability to sequester carbon, contributing to broader climate change. Managing forest resources is therefore essential for maintaining ecological stability and protecting the planet's diverse life forms.

164. (D) An ecosystem
In ecology, an ecosystem is considered the fundamental unit of study. It comprises all the living organisms, or biotic components, in a given area, interacting with their non-living physical environment, or abiotic components. These interactions facilitate the flow of energy and the cycling of nutrients, creating a functional system that maintains balance and stability. Ecosystems can vary greatly in size and type, from a small pond to a vast forest. Understanding how these systems function is essential for studying biodiversity, resource management, and the impacts of human activities on nature.

165. (B) P-2, Q-4, R-1, S-3
Human ecology is the interdisciplinary study of human adaptation to and interaction with the environment. Trophic levels identify the specific

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position an organism occupies within a food chain based on its energy source. Deep ecology is a radical environmental philosophy that promotes ecocentrism and the intrinsic value of nature independent of human utility. Agenda 21 is a non-binding action plan that serves as a global blueprint for sustainable development. Matching these concepts with their associated ideas helps clarify the different approaches and terms used in environmental science and policy frameworks.

166. (B) Dry weight of all organisms at each trophic level.
A pyramid of biomass represents the total dry weight of all living organisms at each successive trophic level within an ecosystem. This measure provides a more accurate representation of the amount of biological material and stored energy available than a simple pyramid of numbers. Typically, biomass decreases at higher trophic levels due to the inefficient transfer of energy. However, in some aquatic ecosystems, the pyramid can be inverted if the producers have a high turnover rate. Overall, biomass pyramids help ecologists analyze the productivity and structural organization of biological communities.

167. (D) The large-scale production and use of nitrogenous fertilizers in agriculture.
Human activities have significantly altered the nitrogen cycle, primarily through the large-scale production and application of nitrogenous fertilizers in agriculture. While nitrogen is essential for crop growth, excess fertilizer can runoff into water bodies, causing eutrophication and oxygen depletion. Additionally, burning fossil fuels releases nitrogen oxides into the atmosphere, contributing to acid rain and smog. These human impacts have doubled the rate of nitrogen entry into terrestrial ecosystems, disrupting natural balances and leading to various environmental issues such as soil acidification and loss of biodiversity in affected regions.

168. (A) Only 10% of the energy from a lower trophic level is transferred to the next higher level.
The ten percent law is a fundamental principle in ecology describing the efficiency of energy transfer between trophic levels. It states that only about ten percent of the energy consumed at one level is converted into biomass and made available to the next higher level. The remaining ninety percent is lost primarily as heat through metabolic processes like respiration, or remains in undigested waste. This progressive energy loss limits the total number of trophic levels an ecosystem can support and explains why top predators are relatively rare compared to producers.

169. (B) 3 and 4
Atmospheric pollution involves the presence of harmful substances in the air, such as particulate matter (PM2.5) and sulfur dioxide, which can damage health and ecosystems. Land degradation refers to the deterioration of land quality and productive capacity, often due to human activities like unsustainable farming or deforestation. In contrast, global warming is primarily caused by greenhouse gas concentrations, not ozone depletion. Urban Heat Islands are characterized by warmer, not cooler, temperatures in cities. Therefore, only the third and fourth statements accurately describe these environmental hazards and their characteristics.

170. (A) Both A and R are true and R is the correct explanation of A.
The Kyoto Protocol introduced a cap and trade system as a market-based mechanism to reduce greenhouse gas emissions. Under this system, countries were assigned specific emission caps. Those that reduced their emissions below their limit could sell their excess permits to other countries that exceeded their caps. This created a financial incentive for nations and industries to adopt cleaner technologies and more efficient practices. By attaching a monetary value to carbon emissions, the system aimed to achieve global reduction targets in a cost-effective and flexible manner across different international economies.

171. (C) Were adopted by the United Nations to be achieved by 2030.
The Sustainable Development Goals (SDGs) are a set of 17 universal goals adopted by all United Nations Member States in 2015. They are part of the 2030 Agenda for Sustainable Development, providing a shared blueprint for achieving a better and more sustainable future for all. Unlike previous frameworks, the SDGs are integrated and apply universally to both developed and

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developing countries. They address a wide range of global challenges, including poverty, inequality, climate change, environmental degradation, and peace and justice, with a specific target for completion by the year 2030.

172. (D) Human Ecology
Human Ecology is an interdisciplinary field that focuses on the complex interrelationships between human communities and their natural, social, and built environments. It emphasizes how human societies adapt to their surroundings through culture, technology, and social organization, and how these environments are in turn modified by human activity. By analyzing humans as integral components of ecosystems, human ecology addresses issues of sustainability, resource management, and the impacts of anthropogenic changes. This perspective is essential for understanding the dynamic and reciprocal relationship between people and the planet's diverse ecological systems.

173. (C) Grass → Rabbit → Fox
A food chain represents a linear sequence of feeding relationships within an ecosystem. It begins with a primary producer, such as grass, which captures solar energy through photosynthesis. This producer is then eaten by a primary consumer, or herbivore, like a rabbit. The herbivore is subsequently preyed upon by a secondary consumer, or carnivore, such as a fox. This hierarchy illustrates the one-way flow of energy and nutrients from plants to higher-level consumers, showing how different species are linked through their nutritional needs and energy transfer processes.

174. (D) Codify principles, procedures, and standards to protect the environment.
The main objective of a national environmental legal framework is to codify the principles, procedures, and standards necessary for protecting the environment and managing natural resources. It provides a clear set of rules for pollution control, waste management, and conservation. By establishing these legal requirements, the government can regulate human activities, monitor compliance, and enforce penalties for violations. This structured approach ensures that developmental activities are sustainable and that the environment is preserved for the health and well-being of both current and future generations within the country.

175. (C) The belief in the intrinsic value of non-human nature (ecocentrism).
Deep Ecology is distinguished from mainstream environmentalism by its fundamental belief in the intrinsic value of all living beings and ecosystems, independent of their utility to humans. This ecocentric perspective argues that the natural world has worth in its own right and should be protected for its own sake. Deep ecologists critique anthropocentrism, which views nature only as a resource to be managed. They advocate for a profound shift in human consciousness and social structures to prioritize the health and integrity of the entire ecosphere over mere human-centered economic and technological advancement.

176. (B) Afforestation
Land degradation involves the deterioration of soil quality and ecological health, often leading to reduced productivity and biodiversity. Examples include desertification, soil erosion, and soil salinization, which are typically driven by unsustainable human activities or extreme climatic variations. In contrast, afforestation is the process of planting trees on land that has not recently been forested. This is a beneficial environmental practice used to restore ecosystems, prevent erosion, and sequester carbon. Therefore, afforestation acts as a solution to land degradation rather than being an example of the degradation process itself.

177. (C) Statement I is correct, but Statement II is incorrect.
The Paris Agreement aims to limit the global average temperature increase to well below 2 degrees Celsius above pre-industrial levels, with efforts to restrict it to 1.5 degrees. This goal is central to international climate action. However, the agreement does not operate on a top-down system of imposed binding cuts. Instead, it relies on a bottom-up approach where each signatory nation determines and submits its own climate targets through Nationally Determined Contributions (NDCs). This universal participation recognizes each country's unique capabilities and national circumstances

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statements correctly describe these fundamental ecological principles and functional components.

227. (A) Both A and R are true and R is the correct explanation of A.
Deep ecologists critique mainstream environmentalism as being too shallow because it primarily adopts an anthropocentric perspective. They argue that shallow environmentalism focuses only on symptoms, such as pollution and resource depletion, to ensure human comfort and economic stability. In contrast, Deep Ecology promotes an ecocentric worldview, ascribing intrinsic value to all life forms independent of their utility to humans. It seeks to address the root philosophical cause of environmental degradation by advocating for a fundamental shift in how humans perceive and value the natural world and their place within the ecosphere.

228. (D) Higher air temperatures in urban areas compared to surrounding rural areas.
A primary characteristic of the Urban Heat Island effect is that air temperatures in metropolitan areas are significantly higher than those in surrounding rural regions. This phenomenon is driven by human activities and the replacement of natural vegetation with heat-absorbing materials like concrete and asphalt. These urban surfaces have low albedo and high thermal mass, causing them to absorb more solar radiation and release it slowly as heat. Additional factors include waste heat from buildings and vehicles. Understanding UHIs is essential for urban planning, energy management, and protecting the health of urban populations.

229. (C) Statement of a nation's intentions and principles for environmental management.
A national environmental policy serves as a formal statement of a country's intentions, goals, and guiding principles for managing and protecting its natural resources. It provide a strategic framework for coordinating the actions of various government agencies and for developing specific environmental laws and regulations. While not an international treaty itself, the policy reflects the nation's commitment to sustainability and environmental protection. It helps guide decision-making, integrate environmental concerns into developmental plans, and promote public participation and cooperation between different sectors of society to achieve long-term ecological and public health objectives.

230. (D) The Kyoto Protocol
The Clean Development Mechanism (CDM) was a flexible mechanism established under the Kyoto Protocol to help industrialized nations meet their emission reduction targets. It allowed these countries to invest in emission-reduction projects in developing nations and receive tradable carbon credits in return. This mechanism aimed to promote sustainable development in developing countries while providing a cost-effective way for developed countries to achieve their climate goals. The CDM was a key feature of the protocol's market-based approach, encouraging global cooperation and the transfer of clean technologies between nations to mitigate climate change.

231. (A) 2, 4, 1, 3
In a grazing food chain, organisms are organized by their trophic levels, reflecting the flow of energy from the source. Producers, such as plants, form the base at the first level (2). Primary consumers, typically herbivores that eat the plants, occupy the second level (4). Secondary consumers, which prey on herbivores, are at the third level (1). Finally, tertiary consumers, or top predators, sit at the highest level (3). This sequence correctly illustrates the hierarchical structure and the unidirectional transfer of nutrients and energy within a typical terrestrial or aquatic biological community.

232. (B) Increasing concentration of a substance in organisms at successively higher levels in a food chain.
Biomagnification is the process whereby the concentration of certain persistent pollutants increases as they move up the food chain. Organisms at higher trophic levels consume many individuals from lower levels, accumulating the toxins stored in their prey's tissues. This results in top predators having the highest concentrations of these substances, which can lead to severe health and reproductive issues. This phenomenon highlights the dangers of introducing stable, toxic chemicals into ecosystems, as they can have far-reaching and devastating impacts on

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Producers, also known as autotrophs, are organisms that can create their own organic compounds from inorganic substances. Most producers, such as green plants and algae, use solar energy through photosynthesis to convert carbon dioxide and water into glucose. These organisms form the base of the food web, providing the essential energy and nutrients that support all other trophic levels, including consumers and decomposers. By synthesizing organic matter, producers facilitate the entry of energy into the ecosystem, making them foundational to the structure and function of all biological communities and natural habitats worldwide.

185. (C) Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC).
The Kyoto Protocol differentiated between Annex I and Non-Annex I countries to formalize the principle of Common But Differentiated Responsibilities and Respective Capabilities. This principle acknowledges that while all nations share a duty to address global warming, their obligations should differ based on their historical contribution to greenhouse gas emissions and their financial and technical capacity. Industrialized nations in Annex I were assigned binding emission targets, while developing countries were not. This framework aimed to ensure a more equitable global response to climate change, reflecting the diverse developmental stages and responsibilities of different nations.

186. (B) The process of nitrogen fixation and cycling.
An ecosystem function refers to the dynamic and collective processes that maintain the stability and productivity of an ecological system. The process of nitrogen fixation and cycling is a prime example, as it involves the movement and transformation of an essential nutrient between biotic and abiotic components. This function ensures that nitrogen is available for primary productivity and supports the entire food web. In contrast, the number of species or physical features are structural components, and rainfall is an abiotic factor. Understanding functions like nutrient cycling is crucial for assessing ecosystem health and resilience.

187. (D) A metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.
An Urban Heat Island is a localized climatic phenomenon where a metropolitan area experiences significantly higher temperatures than its surrounding rural regions. This warming is primarily caused by human activities, such as the replacement of natural vegetation with heat-absorbing materials like concrete and asphalt. Additionally, waste heat from buildings, vehicles, and industrial processes contributes to the temperature increase. The lack of green space and reduced evapotranspiration further exacerbate the heat. Understanding UHIs is essential for urban planning, energy management, and protecting the health of city dwellers during periods of extreme heat.

188. (C) Statement I is correct, but Statement II is incorrect.
A pyramid of biomass represents the total dry weight of all living organisms at each trophic level within an ecosystem. This measure provides a clearer picture of the energy stored in biological material than a simple count of individuals. While many terrestrial biomass pyramids are upright, they can be inverted in certain aquatic ecosystems. This occurs when the primary producers, like phytoplankton, have a high turnover rate and small standing crop compared to the consumers. Therefore, Statement I is accurate, while Statement II is incorrect as biomass pyramids can indeed be inverted in specific circumstances.

189. (C) Environment (Protection) Act, 1986
The Environment Protection Act of 1986 is the primary legal instrument in India that provides a comprehensive framework for the protection and improvement of the environment. It was enacted in response to the Bhopal Gas Tragedy and empowers the central government to set standards, regulate industrial activities, and take measures to prevent and control pollution. The act serves as an umbrella legislation, coordinating the activities of various authorities established under earlier laws like the Water and Air Acts. It is crucial for ensuring that developmental activities are balanced with environmental conservation and public health.

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its diet. This complexity contributes to the overall stability of the ecosystem by offering alternative energy pathways. Therefore, the statement that it represents a single, unbranched pathway is incorrect, as that describes a food chain, not a complex food web.

215. (C) Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.
The precautionary principle is a fundamental concept in environmental law and policy. It suggests that if an action or policy has a suspected risk of causing serious harm to the public or the environment, protective measures should be taken even if full scientific certainty is not yet available. This proactive approach aims to prevent irreversible damage and encourages decision-makers to act cautiously when facing significant ecological threats. By prioritizing prevention over remediation, the principle helps ensure long-term environmental protection and sustainable development in the face of uncertainty and potential hazards.

216. (B) The enhanced greenhouse effect from increased anthropogenic emissions.
The primary driver of contemporary global warming is the enhanced greenhouse effect, which results from the increased concentration of greenhouse gases in the atmosphere due to human activities. Gases such as carbon dioxide, methane, and nitrous oxide are released primarily through the burning of fossil fuels, industrial processes, and agricultural activities. These gases trap outgoing infrared radiation, leading to a rise in the Earth's average surface temperature. While natural factors also influence climate, the rapid warming observed in recent decades is predominantly driven by these significant and ongoing anthropogenic emissions and land-use changes.

217. (B) P-2, Q-4, R-3, S-1
India has enacted several key environmental acts over the decades to protect its diverse natural resources. The Wildlife Protection Act was passed in 1972, followed by the Water Act in 1974 to control pollution. The Forest Conservation Act was enacted in 1980 to manage the use of forest land. Finally, the Environment Protection Act of 1986 provided a comprehensive framework for general environmental protection. Matching these acts with their years of enactment illustrates the country's developing legislative commitment to addressing various ecological challenges and ensuring sustainable management of its biological and physical components.

218. (A) A healthy environment is essential for human well-being and survival.
An anthropocentric environmental ethic argues that we should protect nature because a healthy and stable environment is fundamental for human survival, well-being, and prosperity. From this human-centered perspective, nature is seen as a vital resource that provide essential services such as clean air, water, and food. While it may support conservation efforts, its primary motivation is the long-term benefit for current and future human generations. This viewpoint differs from ecocentrism or biocentrism, which recognize the intrinsic value of species and ecosystems independent of their utility or benefit to humanity.

219. (C) Statement I is incorrect, but Statement II is correct.
The Kyoto Protocol did not set uniform emission targets for all nations; instead, it imposed legally binding targets only on developed countries, while developing nations did not have such mandates. In contrast, the Paris Agreement allows each signatory country to define and submit its own climate action targets, known as Nationally Determined Contributions (NDCs). This flexible, bottom-up approach achieved universal participation by recognizing the unique national circumstances and capabilities of each country. Therefore, Statement I is incorrect because it misrepresents the Kyoto Protocol's structure, while Statement II accurately describes the Paris Agreement's NDC system.

220. (D) Eutrophication
Eutrophication is the process by which a water body becomes enriched with nutrients, typically nitrates and phosphates from agricultural runoff or sewage. This enrichment stimulates the rapid growth of algae and aquatic plants. As these organisms eventually die and decompose, they consume large amounts of dissolved oxygen,

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effective strategies to mitigate their impacts and protect ecological health.

196. (B) It establishes legally binding emission reduction targets for each individual country.
The Paris Agreement is a universal international treaty aimed at limiting global temperature rise to well below 2 degrees Celsius. It requires all signatory countries to submit Nationally Determined Contributions (NDCs) that outline their climate action plans. However, a key feature is that it does not establish legally binding emission reduction targets for individual nations. Instead, the targets themselves are voluntary, while the process of reporting and updating them is mandatory. This bottom-up approach encourages universal participation by allowing countries to set goals that reflect their specific national circumstances and developmental priorities.

197. (C) Respiration by plants, animals, and decomposers
Respiration is the primary biological process by which carbon stored in the biosphere is returned to the atmosphere. During aerobic respiration, plants, animals, and decomposers break down organic compounds like glucose to release energy, producing carbon dioxide as a byproduct. This CO_2 is then released back into the air. This process, along with photosynthesis, maintains the balance of carbon within the biosphere. While combustion and volcanic activity also release carbon, the continuous cycle of photosynthesis and respiration is the fundamental mechanism for regulating atmospheric carbon levels over biological time scales.

198. (D) An ecosystem dominated by human activity, with its own flows of energy and materials.
From the perspective of Human Ecology, a city can be viewed as a complex ecosystem that is heavily dominated by human activity. Like natural ecosystems, urban areas have their own unique flows of energy and materials, driven by technological and social processes. Cities consume vast amounts of resources and produce significant waste, while their built environment modifies local climates and hydrological cycles. By analyzing cities through an ecological lens, researchers can better understand the interactions between urban populations and their environment, promoting more sustainable urban planning and effective resource management.

NODIA

199. (A) Environmental Ethics
Environmental Ethics is the branch of philosophy that examines the moral relationship between human beings and the natural world. It addresses critical questions about humanity's responsibilities toward ecosystems, non-human species, and future generations. This field explores whether nature has intrinsic value independent of human utility and investigates the ethical basis for conservation and sustainable development. By providing moral principles and frameworks, environmental ethics guides decision-making and policy-formulation, encouraging a more responsible and respectful human interaction with the environment to ensure the long-term health and stability of the planet's diverse ecological systems.

200. (B) 2 and 4
The Kyoto Protocol set binding targets for greenhouse gas emissions specifically for developed countries, or Annex I parties. The Paris Agreement relies on Nationally Determined Contributions (NDCs) from all participating nations, both developed and developing. In contrast, the Brundtland Commission defined sustainable development, not the ecological footprint, and Agenda 21 is a non-binding action plan, not a legally binding treaty. Therefore, only the second and fourth statements accurately describe these international environmental programs and their core mechanisms. This distinction is vital for understanding the evolution of global climate governance.

201. (B) Tertiary Consumers
In a terrestrial ecosystem, energy is lost at each successive trophic level due to the inefficient transfer of energy through the food chain. According to the ten percent law, only a small portion of energy from one level is available to the next, with the rest lost primarily as heat. As a result, the highest trophic levels, such as tertiary consumers, contain the least amount of energy. This progressive dissipation limits the total number of levels and explains why top predators are generally fewer in number and biomass than producers or primary consumers.

while working toward a common global climate objective.

178. (D) Eutrophication
Eutrophication is a process where a water body becomes overly enriched with nutrients, often due to runoff from agricultural fertilizers or sewage. This enrichment triggers the rapid growth of algae, leading to blooms that block sunlight and eventually die. As decomposers break down the dead algae, they consume large amounts of dissolved oxygen, creating hypoxic conditions. These dead zones are fatal to fish and other aquatic life, resulting in a significant loss of biodiversity and a decline in water quality. This classic environmental issue highlights the impact of nutrient pollution on aquatic ecosystems.

179. (C) Geo-chemical cycles involve the recycling of matter, while energy flows in one direction.
A fundamental difference between geo-chemical cycles and energy flow is their pathway within an ecosystem. Energy enters the system through producers and is transferred through trophic levels, with a significant portion being lost as heat at each stage. This flow is unidirectional and non-cyclic. In contrast, geo-chemical cycles involve the continuous recycling of matter, such as carbon and nitrogen, between biotic and abiotic components. These elements are transformed into different forms but remain within the system, allowing them to be used repeatedly by different organisms over long periods of time.

180. (C) 1, 3, and 5
Ecosystems are geographically classified into terrestrial biomes like forests and aquatic systems like oceans. Trophic levels describe the functional position of organisms within a food web based on their energy source. Geo-chemical cycles, such as the carbon cycle, are essential for recycling nutrients between biotic and abiotic components. Human ecology is highly relevant to modern urban ecosystems, studying the complex interactions between cities and the environment. Energy flow is unidirectional, not cyclic. Therefore, only the first, third, and fifth statements accurately reflect these fundamental ecological concepts and their applications today.

181. (A) Inter-generational equity, balancing the needs of present and future societies.
The Brundtland Commission's definition of sustainable development centers on the concept of inter-generational equity. It emphasizes that the current generation has a responsibility to meet its needs without compromising the ability of future generations to meet their own. This requires a careful balance between economic growth, environmental protection, and social equity. By recognizing that natural resources are finite and that ecological health is essential for long-term well-being, this definition provides a foundational framework for modern environmental policy and international efforts to ensure a sustainable future for all people worldwide.

182. (D) Ground-level ozone
Ground-level ozone is a primary component of photochemical smog, a type of atmospheric pollution common in urban areas. Unlike the protective ozone layer in the stratosphere, ground-level ozone is harmful to human health and the environment. It is not emitted directly but forms through complex chemical reactions between nitrogen oxides and volatile organic compounds in the presence of sunlight. These pollutants often originate from vehicle exhaust and industrial emissions. High concentrations of ground-level ozone can cause respiratory problems, damage crops, and reduce visibility, making it a significant environmental and public health concern.

183. (C) Biocentrism/Ecocentrism
Biocentrism and ecocentrism are ethical viewpoints that ascribe intrinsic value to the natural world. Biocentrism argues that all individual living species have a right to exist, while ecocentrism emphasizes the value of entire ecosystems and the biological community as a whole. Both perspectives reject anthropocentrism, which views nature solely for its utility to humans. By recognizing the inherent worth of nature independent of human benefit, these viewpoints promote a moral responsibility to protect biodiversity and maintain ecological integrity. This ethical foundation is essential for many radical and non-traditional environmental movements and conservation philosophies.

184. (B) Producers (autotrophs)

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Sustainable Development Goal 14 focuses on life below water, with the central aim of conserving and sustainably using the world's oceans, seas, and marine resources. This goal addresses critical issues such as marine pollution, overfishing, and the impacts of ocean acidification. It emphasizes the importance of protecting marine and coastal ecosystems to maintain biodiversity and support the livelihoods of millions of people. Achieving SDG 14 is essential for planetary health, as oceans regulate the global climate, provide food, and are a vital part of the Earth's life support system.

209. (C) Adopts a 'bottom-up' approach with Nationally Determined Contributions.
A fundamental difference in the approach between the Kyoto Protocol and the Paris Agreement is the shift from top-down mandates to a bottom-up framework. The Kyoto Protocol set legally binding targets only for developed nations. In contrast, the Paris Agreement utilizes a bottom-up approach where all participating countries, both developed and developing, determine and submit their own climate targets through Nationally Determined Contributions (NDCs). This universal participation recognizes that climate change is a global challenge requiring collective action while providing flexibility for each country to set goals aligned with its specific national circumstances.

210. (A) 1, 2, 3, and 4
Environmental ethics is a field of applied ethics that examines the moral basis of human responsibility toward the natural world. It includes several major perspectives, such as anthropocentrism, which is human-centered, and Deep Ecology, a radical, ecocentric viewpoint ascribing intrinsic value to all life. While it can address animal rights, its scope is much broader, encompassing ecosystems, future generations, and global sustainability. Therefore, the first four statements accurately reflect the nature and diverse perspectives within this discipline. Understanding these frameworks is essential for developing responsible environmental policies and individual ecological stewardship.

211. (C) The burning of fossil fuels
Human activities have a direct and significant impact on the carbon cycle, primarily through the burning of fossil fuels like coal, oil, and natural gas. This process rapidly releases large quantities of carbon that had been stored underground for millions of years back into the atmosphere as carbon dioxide. Additionally, large-scale deforestation reduces the number of trees available to sequester carbon through photosynthesis. These anthropogenic actions have significantly increased atmospheric CO_2 levels, disrupting the natural balance of the cycle and serving as the primary driver of current global climate change and oceanic acidification.

212. (B) Pyramid of Energy
In an ecosystem, the pyramid of energy is always upright and can never be inverted. This is because energy transformation is inherently inefficient, and a significant portion is lost as heat at each successive trophic level, according to the second law of thermodynamics. Only a fraction of the energy from one level is available to the next. In contrast, pyramids of numbers and biomass can sometimes be inverted in specific scenarios, such as a single tree supporting many insects or in certain aquatic environments. The energy pyramid uniquely reflects the fundamental constraints of productivity.

213. (C) A lentic ecosystem
A lentic ecosystem is a geographically classified freshwater body where the water is stationary or still, such as a pond, lake, or wetland. These systems differ from lotic ecosystems, which involve flowing water like rivers and streams. Lentic environments are characterized by specific biological communities adapted to still water and have distinct physical zones based on light penetration and depth. Understanding the dynamics of lentic ecosystems is essential for water resource management and biodiversity conservation, as they provide critical habitats for many species and play a vital role in local hydrological cycles.

214. (D) It represents a single, unbranched pathway for energy transfer.
A food web is a comprehensive model that illustrates the complex and interlocking feeding relationships within an ecosystem. Unlike a simple, linear food chain, a food web shows that organisms often have multiple food sources and predators. Within this network, a single species can operate at several trophic levels depending on

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190. (D) The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992
Agenda 21 was a landmark outcome of the 1992 United Nations Conference on Environment and Development, also known as the Rio Earth Summit. This non-binding action plan provided a comprehensive blueprint for achieving sustainable development at global, national, and local levels. It addressed a wide range of issues, including poverty, resource management, and the role of major groups. The adoption of Agenda 21 marked a significant step in international environmental policy, encouraging nations to integrate environmental concerns into their developmental strategies and fostering global cooperation toward a more sustainable and equitable future.

191. (A) Both A and R are true and R is the correct explanation of A.
In a complex food web, organisms can occupy multiple trophic levels depending on their diverse feeding habits. For example, omnivores like humans or bears consume both plants and animals. When eating plants, they act as primary consumers (T2). When eating herbivores, they function as secondary consumers (T3). This flexibility provides a more realistic and comprehensive representation of feeding relationships in nature than a linear food chain. Understanding these overlapping roles is essential for analyzing energy flow and the overall stability and resilience of various biological communities and natural ecosystems.

192. (B) A hazard is a potential threat, while a disaster is the realization of that threat with significant impact on a community.
In environmental science, a hazard is defined as a potential event or condition that poses a threat to people, property, or the environment. It represents a possibility of harm. A disaster, in contrast, occurs when a hazard is realized and has a significant, negative impact on a community, often exceeding its capacity to cope. For example, a volcano is a hazard, but an eruption that destroys a town is a disaster. Understanding this distinction is essential for effective risk assessment, disaster management planning, and implementing mitigation strategies to reduce overall vulnerability.

193. (C) SDGs integrate economic, social, and environmental dimensions and apply universally to all countries.
The Sustainable Development Goals (SDGs) represent a more comprehensive and ambitious framework than the preceding Millennium Development Goals (MDGs). While the MDGs were primarily focused on social issues in developing nations, the SDGs are universal and apply to all countries regardless of their wealth. Furthermore, the SDGs integrate the three dimensions of sustainable development—economic growth, social inclusion, and environmental protection—into a single, cohesive agenda. This integrated approach recognizes that global challenges are interconnected and require universal cooperation to achieve a more sustainable, equitable, and prosperous future for everyone.

194. (D) The amount of usable energy decreases significantly at each successive trophic level.
The flow of energy in an ecosystem is depicted as a pyramid because energy is lost at each successive trophic level. According to the second law of thermodynamics, energy transformation is inefficient, and a large portion is dissipated as heat during metabolic processes like respiration. Only about ten percent of the energy from one level is available to the next. This progressive dissipation ensures that the amount of usable energy decreases as it moves from producers to top predators, limiting the total number of levels and productivity within any given biological community.

195. (A) P-4, Q-3, R-1, S-2
Global warming is primarily driven by the increased concentration of greenhouse gases like carbon dioxide in the atmosphere. Acid rain is caused by emissions of sulfur dioxide and nitrogen oxides reacting with moisture. Eutrophication results from nutrient runoff into water bodies, leading to algal blooms and oxygen depletion. The Urban Heat Island effect is caused by anthropogenic heat and modified urban surfaces that absorb and retain solar energy. Matching these environmental issues with their dominant causes is essential for developing

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leading to hypoxic conditions. These dead zones are fatal to fish and other aquatic life, resulting in a significant decline in water quality and biodiversity. Eutrophication is a major environmental issue affecting both freshwater and coastal marine ecosystems worldwide, necessitating better nutrient management practices.

221. (B) It analyzes how human societies and their environments mutually influence each other.
Human Ecology is an interdisciplinary field that studies the complex and reciprocal relationships between human communities and their environments. It analyzes how human societies adapt to their surroundings through culture, technology, and social organization, and how these environments are in turn modified by human activity. By viewing humans as integral components of ecosystems, human ecology addresses vital issues of sustainability, resource management, and the impacts of anthropogenic changes. This systems-based perspective is essential for understanding the dynamic interaction between people and the planet's diverse and interconnected biological and physical components.

222. (D) The sunlight
An ecosystem is composed of both biotic and abiotic components. Abiotic components are the non-living physical and chemical factors that influence the biological community. Sunlight is a primary abiotic component, as it serves as the ultimate source of energy for photosynthesis. Other examples include temperature, water, soil minerals, and atmospheric gases. In contrast, trees, fungi, and deer are all biotic components, representing the living organisms within the system. Understanding the interaction between these two categories is essential for studying energy flow, nutrient cycling, and the overall stability of any given natural habitat.

223. (C) To graphically represent the structure and function of trophic levels in an ecosystem.
An ecological pyramid is a graphical tool used to represent the structural and functional relationships between different trophic levels in an ecosystem. These pyramids can illustrate the total number of individuals, the total amount of biomass, or the flow of energy at each level, typically starting with producers at the base. By visualizing these distributions, ecologists can analyze the efficiency of energy transfer and the productivity of the system. Ecological pyramids help show how energy and matter are distributed within a community, providing a clear model of ecosystem health and functional organization.

224. (B) Rapidly releasing large quantities of carbon that were stored for millions of years.
The combustion of fossil fuels has a significant impact on the carbon cycle by rapidly releasing large quantities of carbon back into the atmosphere. This carbon had been sequestered deep underground in coal, oil, and gas deposits for millions of years. This sudden release as carbon dioxide disrupts the natural balance between carbon sinks and sources. The resulting increase in atmospheric CO_2 levels is the primary driver of anthropogenic global warming and ocean acidification. This human intervention alters the carbon cycle at a much faster rate than natural geological or biological processes.

225. (C) To establish a single global government.
The Sustainable Development Goals (SDGs) are a set of 17 universal goals aimed at addressing a wide range of global challenges. These include eradicating poverty and hunger, promoting gender equality, ensuring quality education, and combating climate change. The SDGs provide a shared blueprint for peace and prosperity for people and the planet. While they encourage global cooperation and partnership, their objective is not to establish a single global government. Instead, they rely on individual nations to implement strategies within their own frameworks while contributing to universal sustainability and social equity targets.

226. (A) 1 and 3
Primary producers, such as plants, capture solar energy to form the first trophic level in an ecosystem. The nitrogen cycle is a classic example of a geo-chemical cycle, involving the recycling of an essential element between biotic and abiotic components. In contrast, energy flows from producers to consumers, not the other way around. Furthermore, a food web is typically more stable than a simple food chain because it offers multiple alternative pathways for energy transfer. Therefore, only the first and third

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202. (A) Trophic level
Geo-chemical cycles describe the continuous movement and transformation of chemical elements between the Earth's biotic and abiotic components. Key parts of these cycles include reservoirs like the atmosphere or oceans, where elements are stored, and exchange pools where elements are readily available to organisms. Cycling processes such as photosynthesis and decomposition facilitate the movement of these elements. In contrast, a trophic level represents a stage in the unidirectional flow of energy through a food chain. Energy is eventually dissipated as heat and is not recycled, unlike chemical elements in a cycle.

203. (B) Both Statement I and Statement II are incorrect.
A food chain is a simplified, linear model that illustrates a single pathway of energy flow from a producer to a series of consumers. In contrast, a food web is a more complex and realistic model that shows multiple interconnected food chains within an ecosystem. It represents the diverse feeding relationships where organisms often have multiple food sources and predators. Therefore, both statements are incorrect because they have swapped the definitions of a food chain and a food web. Understanding these models is essential for analyzing energy transfer and ecosystem stability and resilience.

204. (D) Propose moral principles to guide human interaction with the natural world.
The primary aim of environmental ethics is to propose moral principles and frameworks that guide the relationship between human beings and the natural world. This field of philosophy explores our obligations toward non-human species, ecosystems, and future generations. It investigates whether nature has intrinsic value and how to balance human needs with environmental protection. By providing a moral foundation, environmental ethics helps inform policy decisions and individual behaviors, encouraging a more sustainable and responsible interaction with the environment to ensure the long-term health and stability of our planet's ecological systems.

205. (A) Both A and R are true and R is the correct explanation of A.
Land degradation, including deforestation and desertification, can exacerbate global warming by reducing the planet's capacity to absorb carbon dioxide. Forests and healthy soils act as significant carbon sinks, sequestering atmospheric CO_2 through photosynthesis and organic matter accumulation. When these ecosystems are degraded, they not only lose their ability to absorb carbon but also release stored carbon back into the atmosphere. This increase in greenhouse gas concentrations strengthens the greenhouse effect, leading to further warming. Therefore, protecting land and forest resources is a crucial component of global climate change mitigation strategies.

206. (B) The National Green Tribunal Act, 2010
The National Green Tribunal Act of 2010 established a specialized judicial body in India known as the National Green Tribunal. Its primary purpose is to ensure the effective and expeditious resolution of cases relating to environmental protection and the conservation of forests and other natural resources. The NGT has the authority to handle a wide range of environmental disputes and provide relief and compensation for damages. This specialized tribunal is essential for enforcing environmental laws and ensuring that ecological matters are handled with the necessary expertise, contributing to better environmental governance in the country.

207. (D) The Brundtland Commission
The concept of sustainable development was most prominently and widely defined by the Brundtland Commission in its 1987 report, Our Common Future. The report defined it as development that meets the needs of the present without compromising the ability of future generations to meet their own. This influential definition integrated economic growth, social equity, and environmental protection into a single framework. It laid the essential foundation for subsequent international agreements like Agenda 21 and the Sustainable Development Goals, shaping global environmental policy and developmental strategies for decades to follow across the world.

208. (A) Conserving and sustainably using the oceans, seas, and marine resources.

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entire biological communities and their overall structural integrity.

233. (C) Human Ecology
Human Ecology is the interdisciplinary field that studies the complex and reciprocal relationship between human communities and their natural, social, and built environments. It emphasizes that humans are an integral part of ecosystems, both influencing and being influenced by them. This perspective analyzes how human societies adapt to their surroundings through culture, technology, and social organization, and how these environments are in turn modified by human activity. By analyzing these interactions as a system of mutual influence, human ecology addresses vital issues of sustainability, resource management, and the impacts of anthropogenic environmental changes.

234. (D) A component of the Earth system where an element is stored for a period.
In the context of geo-chemical cycles, a sink or reservoir refers to a specific component of the Earth system where a chemical element is stored for a significant period of time. Examples include the atmosphere as a reservoir for nitrogen, oceans for carbon, and rocks for phosphorus. These reservoirs hold large quantities of the element, which can then be transferred to other components through various physical or biological processes. Understanding the location and capacity of these sinks is essential for analyzing the balance and movement of essential nutrients throughout the planet's diverse and interconnected ecosystems.

235. (C) Periodically assess collective progress towards achieving the agreement's long-term goals.
The global stocktake is a central feature of the Paris Agreement designed to periodically assess the collective progress of all participating nations toward achieving its long-term goals. This assessment, conducted every five years, evaluates global efforts in climate mitigation, adaptation, and financial support. The results of the stocktake are intended to inform and encourage countries to increase their climate ambition in their subsequent Nationally Determined Contributions (NDCs). This transparency and accountability mechanism is essential for ensuring that the global response to climate change remains on track and continues to evolve in a fair and effective manner.

236. (B) The release of large amounts of industrial pollutants into a river.
A major environmental disaster is an event that causes significant and often irreversible damage to ecosystems and human health. The large-scale release of industrial pollutants into a river is a prime example, as it can contaminate water supplies, destroy aquatic life, and lead to long-term health problems for nearby populations. Such events often result from industrial negligence or accidents and highlight the dangers of unsustainable industrial practices. In contrast, activities like crop rotation and the use of solar energy are beneficial environmental practices designed to promote sustainability and reduce human impact on the planet's natural resources.

237. (A) Economic development and social equity.
The Brundtland Report, titled Our Common Future, was a landmark document because it inextricably linked environmental protection with economic development and social equity. It argued that environmental issues cannot be addressed in isolation from the social and economic challenges facing the world today. This integrated approach formed the basis of the sustainable development concept, which emphasizes that long-term prosperity and ecological health depend on achieving a balance between economic growth, social justice, and environmental conservation. This influential perspective has shaped international policy and developmental strategies, encouraging a more holistic and sustainable approach to global challenges.

238. (C) Statement I is correct, but Statement II is incorrect.
A country's environmental legal framework consists of various domestic acts, rules, and notifications designed to regulate pollution and conserve natural resources. In contrast, an environmental policy is a statement of national intentions and principles, rather than a legally binding international document. While policies guide national action and can be influenced by international treaties, they are primarily domestic instruments. Therefore, Statement I is accurate as it correctly describes the legal framework,

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while Statement II is incorrect because it mischaracterizes the nature of a national policy as an international, legally binding obligation.

239. (D) Solar radiation
Solar radiation is the ultimate source of energy for nearly all ecosystems on Earth. Through the process of photosynthesis, primary producers like green plants and algae capture solar energy and convert it into chemical energy stored in organic matter. This energy is then transferred through various trophic levels as organisms consume each other. Without sunlight, the foundational process of photosynthesis would cease, leading to a collapse of almost all food webs. Solar energy powers the Earth's climate and hydrological cycles, making it the fundamental driver of all biological and physical processes on our planet.

240. (C) 1, 2 and 5
The Kyoto Protocol set legally binding targets for greenhouse gas emissions specifically for developed nations, known as Annex I countries. The Paris Agreement expanded this by including commitments from both developed and developing countries through Nationally Determined Contributions (NDCs). The Brundtland Commission Report played a pivotal role by popularizing the concept of sustainable development in 1987. In contrast, Agenda 21 was an outcome of the Rio Earth Summit, and the SDGs are a separate framework for global development. Therefore, the first, second, and fifth statements correctly reflect these international initiatives and their key features.

241. (B) Quaternary consumer
In an ecosystem, organisms are organized into trophic levels based on their feeding relationships. The sequence Grass to Grasshopper to Frog to Snake to Hawk illustrates a typical food chain. Grass is the producer (T1). The grasshopper is the primary consumer (T2), the frog is the secondary consumer (T3), and the snake is the tertiary consumer (T4). The hawk, which preys on the snake, occupies the fifth trophic level and is classified as a quaternary consumer. This hierarchy shows how energy and nutrients move through multiple levels of consumers within a biological community.

242. (A) Desertification
Desertification is a form of land degradation occurring in arid, semi-arid, and dry sub-humid regions. It is characterized by the decline in soil productivity and the loss of vegetation, often resulting from a combination of climatic variations and unsustainable human activities like overgrazing, deforestation, and poor irrigation. When land becomes desertified, it loses its ability to support life and agricultural activities, leading to severe economic and social impacts. Understanding desertification is essential for implementing sustainable land management practices and protecting vulnerable ecosystems and populations in dryland regions across the entire globe.

243. (C) Ecocentric
Deep Ecology is an environmental philosophy characterized by an ecocentric worldview. It argues that the entire ecosphere and its components have intrinsic value, independent of their utility or benefit to human beings. This perspective rejects anthropocentrism, which prioritizes human needs, and promotes a profound shift in consciousness toward recognizing the inherent worth of all life forms. Deep ecologists advocate for fundamental changes in how human societies interact with nature, emphasizing stewardship and the protection of biodiversity to maintain the health and integrity of the planet's diverse and interconnected ecological systems for their own sake.

244. (D) SDG 6 - Clean Water and Sanitation
Sustainable Development Goal 6 is dedicated to ensuring the availability and sustainable management of water and sanitation for all. This goal recognizes that access to safe water and sanitation is a fundamental human right and essential for health, education, and economic growth. It addresses critical issues such as water scarcity, water pollution, and the protection of water-related ecosystems. In contrast, SDG 13 is for climate action, SDG 15 is for life on land, and SDG 7 is for affordable and clean energy. Matching SDGs with their correct goals is vital for global development efforts.

245. (C) Predicting and evaluating the environmental consequences of a future project.
An Environmental Impact Assessment is a systematic process used within a national

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legal framework to identify and evaluate the potential environmental consequences of a proposed development project. By conducting this assessment before a project is approved, decision-makers can identify significant impacts and incorporate mitigation measures or consider more sustainable alternatives. It serves as a proactive planning tool to prevent unnecessary ecological damage and ensure that developmental activities are conducted in a manner that protects natural resources and public health. An EIA is an essential component of modern environmental governance and sustainable development planning.

246. (A) 1, 2, 3, 4
Eutrophication typically follows a logical sequence of events. It begins with nutrient enrichment of a water body, often from fertilizers or sewage. This excess of nutrients triggers an algal bloom, which blocks sunlight and eventually dies. As decomposers break down the dead algae, they consume large amounts of dissolved oxygen, leading to severe oxygen depletion in the water. These hypoxic conditions result in a massive die-off of fish and other aquatic organisms. This sequence illustrates how nutrient pollution can lead to the rapid and devastating degradation of aquatic ecosystems and loss of biodiversity.

247. (D) Return essential elements from dead organic matter to their inorganic form.
Decomposers, primarily bacteria and fungi, play a vital role in geo-chemical cycles by breaking down dead organic matter and animal waste. Through this process, they return essential elements like nitrogen, carbon, and phosphorus to their inorganic forms in the soil, water, and atmosphere. This recycling is fundamental for sustaining life, as it makes these nutrients available once again for uptake by primary producers. Without the activity of decomposers, essential elements would remain trapped in organic remains, leading to a depletion of resources and a eventual collapse of all biological communities and natural habitats.

248. (A) P-3, Q-2, R-1, S-4
In an ecosystem, temperature is a primary abiotic factor that influences biological activity. A rabbit is a primary consumer, as it feeds directly on plants. Earthworms are detritivores, as they consume dead organic matter and contribute to nutrient recycling. The nitrogen cycle is an example of a geo-chemical cycle involving the transformation and movement of an essential element through biotic and abiotic components. Matching these terms with their correct examples helps clarify the structural organization and functional processes that maintain the stability and productivity of natural and human-modified ecological systems worldwide.

249. (C) The absorption of solar radiation by dark surfaces and the release of waste heat from buildings and vehicles.
A key reason for the formation of Urban Heat Islands is that dark urban surfaces, such as asphalt and concrete, absorb and store significant solar radiation. These materials have low albedo and high thermal mass, causing them to re-radiate this energy as heat. Additionally, cities release substantial waste heat from vehicles, industrial processes, and building air conditioning systems. The lack of natural vegetation and reduced evapotranspiration further limit cooling in metropolitan areas. These factors work together to create significantly higher temperatures in cities compared to surrounding rural regions, impacting local climate and energy demand.

250. (D) The SDGs are a more recent, universal, and goal-oriented framework that builds upon the principles established in Agenda 21.
The Sustainable Development Goals (SDGs) are a universal framework adopted by the United Nations in 2015, building upon the foundational principles established in Agenda 21. While Agenda 21 was a broad and non-binding action plan for sustainable development, the SDGs are more specific, universal, and goal-oriented, with 17 integrated targets to be achieved by 2030. Both frameworks share the objective of promoting environmental sustainability, economic growth, and social equity. The SDGs represent a more comprehensive and cohesive global strategy to address interconnected challenges like climate change and poverty in the twenty-first century.

251. (B) The study of the interactions between human societies and their environmental settings.
Human Ecology is a specialized field investigating the dynamic relationships between human populations and their environments. It examines

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methods. These improper practices deplete the soil of essential nutrients and moisture, making it highly susceptible to erosion. In semi-arid environments, such mismanagement leads to rapid land degradation, demonstrating how human decisions in food production can fundamentally destroy the long-term productive capacity of the landscape.

286. (D) To provide the enforceable laws and regulations for environmental protection.
A national environmental legal framework provides the essential foundation for governance by establishing enforceable rules. These laws and regulations allow the state to control pollution levels, protect endangered wildlife, and manage natural resources through legal mandates. Without this framework, environmental standards would be mere suggestions rather than requirements, as the legal system provides the authority needed for compliance and enforcement.

287. (C) A programme is a specific initiative designed to implement the goals set out in a policy.
National environmental policies and programmes serve different roles within a governance hierarchy. A policy articulates a broad vision and sets general objectives for environmental protection. A programme, however, is a specific, operational instrument created to turn those abstract goals into reality. Programmes provide the concrete action plans and measurable initiatives required to achieve the priorities defined in the overarching policy document.

288. (B) Legal Framework → Policy → Programme.
Environmental governance typically follows a hierarchical structure that moves from broad mandates to specific actions. The legal framework provides the statutory authority and laws. Stemming from these laws, the national policy outlines the government's strategic vision and priorities. Finally, specific programmes and action plans are developed to implement the policy goals through operational, measurable projects and initiatives.

289. (D) an environmental policy.
A document that sets broad goals, such as a thirty percent reduction in emissions, and outlines a vision for sustainable development across sectors is an environmental policy. Policies serve as guiding documents that articulate the government's intentions and principles. They provide the strategic direction for environmental action but are usually broader and less operationally detailed than specific technical programmes or legal acts.

290. (A) It would lack the legal authority needed for enforcement.
While an environmental policy provides a valuable vision and set of goals, it does not carry the weight of law on its own. To be effective, policy objectives must be supported by a legal framework that provides the authority to enforce standards and penalize violations. Without this legal backing, a policy remains an aspirational document that cannot compel compliance from industries or individuals.

291. (C) It would lack the legal authority needed for enforcement.
The Brundtland Commission's 1987 report, "Our Common Future," is historically significant for introducing the concept of sustainable development to a global audience. By defining development in terms of meeting both present and future needs, the report successfully reconciled economic growth with environmental conservation. This conceptual breakthrough provided a new framework for international cooperation that continues to guide global environmental policy today.

292. (A) the needs of future generations.
The defining principle of sustainable development is the balance between current human requirements and the preservation of resources for the future. It emphasizes that economic and social progress must be achieved in a way that does not deplete the environmental foundations required by those who will follow. This intergenerational equity ensures that today's development does not compromise the survival or prosperity of future populations.

293. (D) a non-binding action plan for sustainable development.
Adopted at the 1992 Earth Summit, Agenda 21 is a comprehensive blueprint for global action in the twenty-first century. It provides detailed strategies for addressing human impacts on the

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260. (A) A single, large oak tree supporting thousands of herbivorous insects.
While energy pyramids must remain upright, pyramids of numbers can be inverted if the primary producer is large enough to sustain many consumers. A single massive tree provides ample resources for thousands of individual insects, resulting in a narrow base and a wider secondary level. This represents a scenario where the physical count of organisms increases at higher trophic levels.

261. (D) The circulation of elements between living organisms and the non-living environment.
Geo-chemical cycles describe the continuous movement and transformation of essential chemical elements throughout the Earth's systems. These cycles facilitate the exchange of matter between biotic components, like plants and animals, and abiotic components, such as the atmosphere, soil, and water. This constant circulation ensures that life-sustaining nutrients remain available for reuse, maintaining the long-term persistence of global ecosystems.

262. (B) nitrogen fixation.
Nitrogen fixation is a specialized biological process where atmospheric nitrogen gas is converted into ammonia or nitrates. Although nitrogen is abundant in the atmosphere, most living organisms cannot use it in its gaseous form. Certain soil-dwelling bacteria perform this vital transformation, making the element available to plants, which then introduce it into the broader food web for other organisms.

263. (C) The splitting of water molecules during photosynthesis.
Photosynthesis serves as the primary mechanism for generating free atmospheric oxygen. During this process, autotrophs utilize solar energy to split water molecules into their constituent parts. This chemical reaction releases oxygen as a byproduct while simultaneously absorbing carbon dioxide to create energy-rich carbohydrates. This fundamental biological activity is essential for maintaining the oxygen levels required for aerobic respiration in animals.

264. (D) The processes that generate atmospheric oxygen tend to consume atmospheric carbon, and vice versa.
The carbon and oxygen cycles are fundamentally linked through a feedback loop involving photosynthesis and respiration. Photosynthesis consumes carbon dioxide to produce oxygen, while aerobic respiration consumes oxygen to release carbon dioxide. This reciprocal relationship ensures that the atmosphere remains balanced, as the biological output of one cycle serves as the necessary input for the other to function properly.

265. (A) Photosynthesis by plants.
Plants act as the primary gateway for carbon to enter the biotic parts of terrestrial ecosystems. Through photosynthesis, they absorb carbon dioxide directly from the atmosphere and incorporate the carbon into their tissues as biomass. This process converts inorganic atmospheric carbon into organic forms that can be utilized by consumers, effectively sequestering carbon and moving it through the living food chain.

266. (B) The intrinsic value of all living organisms.
Deep Ecology is a non-anthropocentric philosophy that argues all living beings and natural systems have value independent of their use to humans. It rejects the idea that nature exists solely to provide resources for human consumption. Instead, it promotes biocentric equality, asserting that humans are just one part of a larger ecological web with no superior moral status.

267. (B) By rejecting a human-centered motivation for preserving nature.
Shallow environmentalism focuses on environmental protection primarily to ensure human health and resource availability, which remains an anthropocentric perspective. Deep Ecology differentiates itself by advocating for nature's preservation based on its own inherent rights. It calls for a shift in consciousness where humans reduce their impact out of respect for all life forms rather than for purely utilitarian benefits.

268. (A) a perspective rooted in Deep Ecology.
The argument that a forest should be protected because its components have an inherent right to exist aligns perfectly with Deep Ecology. This viewpoint prioritizes the intrinsic value of the

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CHAPTER 05

Population and Settlement Geography

1. Which of the following sources of population data is designed to be a complete enumeration of a population at a specified time?
(A) Sample survey
(B) Census
(C) Vital statistics registration
(D) Migration records

2. The theory of population growth which states that population increases geometrically while food supply increases arithmetically was proposed by whom?
(A) Thomas Malthus
(B) David Ricardo
(C) Michael Sadler
(D) Henri Pirenne

3. Which of the following statements most accurately describes a 'primate city'?
(A) It is the second-largest city in a nation's urban hierarchy, following the rank-size rule.
(B) It is one of several similarly sized urban centers that constitute the core of a nation's economy.
(C) It is a city that is significantly larger and more dominant than other cities in the country.
(D) It is a city designated as a historical or traditional capital with limited modern administrative functions.

4. Read the following statements and select the correct option.
Statement I : The occupational structure of a population refers to the distribution of its workforce across different sectors of the economy.
Statement II : A high proportion of the workforce in the primary sector is typical of a developed economy.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

5. Match List I with List II and select the correct answer using the codes given below.
List I: (Theorist)
P. Thomas Malthus
Q. Michael Sadler
R. David Ricardo
S. Warren Thompson
List II: (Core Concept)
1. Density and fertility are inversely related.
2. Population growth is linked to the 'iron law of wages'.
3. Formulated the Demographic Transition Model.
4. Population growth tends to outrun the means of subsistence.
Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-4, S-3

6. All of the following are typically considered measures of mortality EXCEPT:
(A) Crude Death Rate (CDR)
(B) Total Fertility Rate (TFR)
(C) Infant Mortality Rate (IMR)
(D) Life Expectancy at Birth

7. A developing country's population pyramid typically shows a wide base and a narrow top. This structure primarily indicates:
(A) A high life expectancy and low birth rate.
(B) A low infant mortality and an aging population.
(C) A large immigrant population and low fertility.
(D) A high birth rate and high death rate.

8. Read the following assertion and reason and select the correct option.
Assertion (A) : Developed countries often

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heat through transportation, industrial processes, and domestic energy use, all of which contribute to the increased temperatures observed in metropolitan areas.

277. (D) Nitrogen oxides from vehicle emissions.
Nitrogen oxides are major atmospheric pollutants found in urban environments, primarily resulting from the high concentration of internal combustion engines. These compounds are released during the burning of fuel in cars and trucks. Once in the atmosphere, they contribute to the formation of smog and ozone at the ground level, posing serious health risks and degrading the overall quality of urban air.

278. (B) water pollution from non-point sources.
Urban runoff serves as a primary pathway for non-point source water pollution. As rainwater flows over city surfaces, it collects a variety of accumulated contaminants like oil, chemicals, and heavy metals. Because this pollution comes from broad, diffuse areas rather than a single pipe, it is difficult to control. Eventually, this tainted water flows into storm drains and local water bodies.

279. (C) Higher temperatures in cities can increase the demand for cooling, leading to higher energy use and more waste heat.
The Urban Heat Island effect creates a feedback loop with energy consumption. Elevated temperatures in urban centers increase the need for air conditioning to maintain indoor comfort. This higher demand leads to greater energy use, which in turn releases more waste heat from cooling units into the outside air. This process further intensifies the heat island effect, demonstrating a complex urban environmental challenge.

280. (D) water pollution via urban runoff.
When heavy rain washes pollutants from roads and industrial sites into nearby rivers, it exemplifies water pollution caused by urban runoff. This process demonstrates how terrestrial urban surfaces directly affect aquatic ecosystem health. The rainfall acts as a transport mechanism, carrying surface waste into water bodies where it can harm biodiversity and contaminate essential water supplies for humans and wildlife alike.

281. (A) The reduction in the biological or economic productivity of land.
Land degradation is characterized by the long-term loss or deterioration of the land's functional capacity. This process impacts both the biological health of ecosystems and their economic value for human use. It involves various physical, chemical, and biological changes—such as erosion or nutrient depletion—that make the land less capable of supporting life, agriculture, or other vital environmental services.

282. (B) planting diverse cover crops.
While activities like deforestation, overgrazing, and improper tillage accelerate land degradation, planting diverse cover crops is a sustainable agricultural practice. Cover crops help protect the soil surface from erosion, improve nutrient cycling, and maintain biological diversity. Unlike the other listed activities that strip the land of its productive capacity, this practice actively works to conserve and restore soil health and stability.

283. (B) chemical deterioration.
Salinization refers to the accumulation of excessive salts in the soil, which inhibits plant growth and damages land productivity. This process is classified as a form of chemical deterioration because it alters the soil's chemical composition. It often results from poor irrigation practices in arid regions, where evaporating water leaves behind salts that eventually reach toxic levels, rendering the land unsuitable for agriculture.

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284. (A) Land degradation can contribute to climate change by reducing the land's capacity to store carbon.
Healthy soil and vegetation act as significant carbon sinks, absorbing carbon dioxide from the atmosphere. When land is degraded, it loses its ability to sequester carbon effectively. This reduction in storage capacity means more carbon dioxide remains in the atmosphere, intensifying the greenhouse effect. Thus, the deterioration of land health directly links to global climate regulation by exacerbating the warming trend.

285. (C) improper agricultural practices.
The farmer's actions, such as planting water-intensive crops repeatedly without recovery time, represent unsustainable agricultural

ecosystem over any economic or recreational benefits it might offer humans. It emphasizes biocentric equality, suggesting that non-human life deserves moral consideration and protection regardless of its practical utility.

269. (C) It would value ecosystems only for the services they provide to humans.
Anthropocentric ethics place human interests at the center of moral concern. Consequently, policies guided by this framework evaluate the environment based on its ability to support human survival, economic growth, and well-being. Ecosystems are protected or managed primarily because they provide essential services—such as clean water, timber, or climate regulation—that are necessary to sustain human societies and their quality of life.

270. (D) all living things have an equal right to exist and thrive.
Biocentric equality is a core principle suggesting that all components of the biosphere possess equal intrinsic worth. This concept challenges traditional human-centered hierarchies by asserting that humans do not have a superior right to exploit the planet. Instead, it implies that every organism and natural system should be allowed to flourish and exist according to its own biological nature.

271. (C) An increase in heat-trapping gases due to human activities.
Global Warming is primarily driven by the intensification of the natural greenhouse effect. Human activities, particularly the burning of fossil fuels since the industrial era, have significantly raised the concentration of atmospheric greenhouse gases. These additional gases trap excess heat within the Earth's climate system, leading to a measurable and long-term increase in the average surface temperature of the planet.

272. (B) absorbing outgoing infrared radiation from the Earth's surface.
Greenhouse gases contribute to warming by allowing solar radiation to reach the Earth but obstructing the escape of heat. After the planet absorbs sunlight, it radiates energy back as infrared radiation. Greenhouse gases are effective at absorbing this outgoing energy and re-emitting it, which traps heat in the atmosphere. This process prevents the energy from escaping into space, thereby warming the surface.

273. (D) Global Warming refers specifically to temperature increase, while climate change encompasses a wider range of long-term weather pattern shifts.
While often used interchangeably, these terms describe different facets of environmental shifts. Global Warming refers specifically to the upward trend in average surface temperatures caused by human-enhanced greenhouse effects. Climate change is a broader term that includes global warming as well as other long-term changes in precipitation, wind patterns, and other climatic variables that occur as a result of rising temperatures.

274. (A) More heat will be trapped in the atmosphere, preventing it from escaping to space.
Increasing the concentration of greenhouse gases directly enhances the atmosphere's ability to retain thermal energy. These gases act like a blanket, capturing the infrared radiation emitted by the Earth's surface. As more of this heat is trapped rather than allowed to radiate back into space, the energy balance of the planet shifts, resulting in the accumulation of heat and global warming.

275. (C) The enhanced greenhouse effect leading to global warming.
Industries that release significant amounts of carbon dioxide and methane contribute directly to the enhanced greenhouse effect. While a natural greenhouse effect is necessary for life, these human-induced emissions artificially increase the heat-trapping capacity of the atmosphere. This leads to an unnatural accumulation of thermal energy, which is the underlying physical driver of current global temperature increases and subsequent climate hazards.

276. (A) land surface modification and waste heat generation.
The Urban Heat Island effect occurs when cities become significantly warmer than their rural surroundings. This is caused by the replacement of natural vegetation with materials like asphalt and concrete, which absorb more solar radiation. Furthermore, cities generate substantial waste

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environment at various levels of governance. Although it is non-binding, meaning nations are not legally forced to follow it, it serves as a critical guiding document for achieving sustainable development goals worldwide.

294. (B) Agenda 21 was a plan of action that built upon the principles of sustainable development popularized by the Brundtland Commission.
There is a clear progression from the conceptual work of the Brundtland Commission to the practical implementation found in Agenda 21. The commission first popularized the idea of sustainable development in its 1987 report. Subsequently, the 1992 Earth Summit produced Agenda 21 as a structured action plan designed to operationalize those very principles on global and local scales.

295. (C) comprehensive, covering actions from the global to the local level.
Agenda 21 was designed to be a highly inclusive and far-reaching framework. It addresses a wide variety of social, economic, and environmental issues where human activity intersects with natural systems. Its scope is truly comprehensive because it outlines specific roles and responsibilities for actors ranging from international organizations and national governments down to local communities and individual citizens.

296. (D) establishment of binding emission targets for industrialized nations only.
The Kyoto Protocol was a landmark climate agreement known for its legally binding nature and its specific focus on developed countries. It operated under the principle of common but differentiated responsibilities, acknowledging that industrialized nations were historically responsible for the majority of emissions. Consequently, it set strict reduction targets for these specific nations while not requiring the same commitments from developing countries.

297. (A) To significantly limit the rise in global average temperature.
The primary objective of the Paris Agreement is to combat climate change by limiting global temperature increases. It specifically aims to keep the rise well below two degrees Celsius above pre-industrial levels, with an additional push to limit the increase to one point five degrees. This goal serves as the central target around which international climate efforts and national action plans are organized.

298. (B) The Paris Agreement requires climate action plans from all nations, not just industrialized ones.
The Paris Agreement represents a shift toward a more inclusive global climate framework compared to the Kyoto Protocol. While Kyoto only placed binding targets on industrialized nations, the Paris Agreement requires all signatory countries, regardless of their development status, to create and report their own climate action plans. These Nationally Determined Contributions ensure that every nation participates in the global effort to reduce emissions.

299. (B) A universal framework of goals integrating development and environmental protection.
The Sustainable Development Goals are a set of seventeen universal targets adopted by all United Nations member states. They are unique because they treat environmental sustainability, social equity, and economic growth as interconnected objectives. By integrating climate action with goals like poverty eradication and health, the SDGs provide a holistic framework for global progress that balances human needs with the health of the planet.

300. (A) The SDGs and the Paris Agreement are mutually reinforcing, with goals like SDG 13 directly supporting climate action.
The Paris Agreement and the Sustainable Development Goals are complementary frameworks that share a vision of a sustainable future. Specifically, SDG 13 focuses on urgent action to combat climate change, which directly aligns with the temperature targets of the Paris Agreement. Progress in one framework facilitates success in the other, as climate stability is essential for achieving broader developmental and environmental objectives.

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how social structures, cultural practices, and technologies influence ecological systems. Rather than viewing humans as external agents, this perspective considers them integral components whose activities fundamentally alter ecosystem stability and function within a geographic context.

252. (A) terrestrial and aquatic settings.
Ecosystems are organized geographically into two broad categories: land-based and water-based environments. These primary terrestrial and aquatic classifications provide a spatial framework for scientific analysis. Sub-types within these categories are further determined by specific climatic, edaphic, and biotic factors that influence the structure and interactions of the various ecological communities inhabiting these settings.

253. (C) The average annual rainfall in a forest.
Abiotic components represent the non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems. Elements such as sunlight, water availability, soil composition, and temperature fall under this category. Rainfall specifically serves as a critical abiotic factor because it dictates the moisture levels available to sustain the biological processes of plants.

254. (D) Humans are considered an integrated part of ecosystems, capable of significantly modifying them.
The Human Ecology perspective explicitly shifts away from the idea that humans exist outside of nature. Instead, it frames human societies as dominant, internal components of the ecosystems they inhabit. Because human activities such as agriculture or urbanization can fundamentally reshape ecosystem structure and stability, humans are viewed as active participants in complex environmental feedback loops and changes.

255. (C) Human Ecology, by analyzing a human-induced change on an aquatic ecosystem.
Studying the impacts of dam construction involves observing how human-engineered technology alters natural systems. This investigation fits into Human Ecology because it explores the relationship between human actions and environmental responses. By evaluating how infrastructure modifications affect aquatic species like fish and abiotic factors like water flow, researchers gain insight into the profound influence humans exert on ecosystems.

256. (B) A food chain represents a single linear pathway of energy, while a food web illustrates multiple interconnected pathways.
Energy movement in ecosystems is modeled using two different structural approaches. A food chain traces a simple, linear sequence of energy transfer from one organism to another. In contrast, a food web provides a more realistic and complex illustration of energy flow by showing how multiple food chains interlink, reflecting the diverse feeding relationships present in nature.

257. (D) Because energy is lost at each transfer between trophic levels.
The pyramid of energy is always upright because it follows the laws of thermodynamics during energy transfer. As energy moves through successive trophic levels, a significant portion is lost as heat. Consequently, only about ten percent of energy is available for incorporation into the next level, ensuring that higher levels always contain less total energy than lower ones.

258. (A) trophic level.
A trophic level identifies the specific position an organism occupies within a food chain or web. It categorizes organisms based on their primary source of energy, starting with producers at the base and moving up through various consumer stages. This hierarchical classification is essential for understanding the structural organization of energy flow and nutrient cycling within any given ecosystem.

259. (C) A diet based on producers makes more efficient use of solar energy than one based on higher-level consumers.
Efficiency in energy use decreases at each subsequent stage of the food chain due to metabolic losses. Since producers capture solar energy directly, consuming them minimizes the energy waste associated with multiple transfers. A diet centered on plants therefore requires less total primary production to sustain, making it a more energy-efficient use of the planet's limited ecological resources.

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implement pro-natalist population policies.
Reason (R) : These countries frequently face challenges associated with an aging population and a potential decline in the workforce.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

9. According to Walter Christaller's Central Place Theory, the ideal shape for a market area is:
(A) A circle
(B) A square
(C) A hexagon
(D) A rectangle

10. Which statement regarding the internal structure of cities is incorrect?
(A) The Multiple Nuclei Model argues that a city develops around a single central business district.
(B) The Concentric Zone Model suggests that cities grow outward from a central area in a series of rings.
(C) The Sector Model proposes that cities develop in a series of sectors, not rings.
(D) Homer Hoyt's model emphasizes the role of transportation corridors in urban growth patterns.

11. Consider the following statements about sources of population data:
1. A census aims to cover every individual within a country's territory.
2. Sample surveys collect data from a representative subset of the population.
3. Vital statistics provide continuous data on births and deaths.
4. Data reliability can be affected by undercounting in remote areas.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 1, 3 and 4 only
(C) 2 and 4 only
(D) 1, 2, 3 and 4

12. The term 'rural-urban fringe' refers to:
(A) The central-most commercial district of a city.
(B) The transitional zone on the outskirts of a city where urban and rural land uses are mixed.
(C) A fully developed residential area with its own governance, far from the city.
(D) A legally defined administrative boundary of a metropolitan area.

13. The primary cause of the explosive world population growth in the 20th century was:
(A) A dramatic and sustained increase in total fertility rates observed across the world.
(B) The cessation of major global conflicts and the resulting increase in life stability.
(C) A significant decline in global mortality rates due to medical and sanitary improvements.
(D) A global policy shift by major international organizations encouraging larger family sizes.

14. Which of the following pairs is correctly matched?
(A) Burgess Model : Sectoral urban growth
(B) Christaller : Law of the Primate City
(C) Homer Hoyt : Central Place Theory
(D) Harris and Ullman : Multiple Nuclei Model

15. Who among the following theorists argued that the origin of towns was a direct result of the agricultural surplus created during the Neolithic revolution?
(A) Gordon Childe
(B) Lewis Mumford
(C) Henri Pirenne
(D) Walter Christaller

16. Read the following assertion and reason and select the correct option.
Assertion (A) : The sex ratio, defined as the number of females per thousand males, is a key social indicator.
Reason (R) : A significantly imbalanced sex ratio can lead to serious social problems, including marriage squeeze and increased violence.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

NODIA

(C) 2, 3, 1
(D) 3, 1, 2

71. A 'global city' is distinguished from a 'megacity' primarily by its:
(A) Sheer population size.
(B) Rate of population growth.
(C) Geographical location in the northern hemisphere.
(D) Functional role in the global economy.

72. One of the major criticisms of census data is its:
(A) High frequency, as it is collected annually.
(B) Timeliness, as the data can be several years out of date by the time it is fully processed and released.
(C) Lack of detail on demographic characteristics.
(D) Focus on only a small sample of the population.

73. The concept of "peri-urban areas" refers to:
(A) The densely populated core of a metropolis containing the central business district.
(B) A planned, self-contained community located far from the main city.
(C) The zone displaying mixed urban and rural features with rapid land use changes.
(D) The historical downtown district of a city containing its oldest municipal buildings.

74. According to Malthus, what is the ultimate check on population growth?
(A) Government policy
(B) Social customs
(C) Emigration
(D) The availability of food

75. Consider the following statements regarding types of migration:
1. Moving from one country to another is international migration.
2. Moving from a village to a city within the same country is internal migration.
3. Fleeing a country due to war is an example of forced migration.
4. Moving for a better job opportunity is an example of voluntary migration.
5. Seasonal movement of pastoralists is a form of cyclical migration.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 1, 2, 3, 4 and 5
(C) 3, 4 and 5 only
(D) 1, 2 and 4 only

76. The Harris and Ullman Multiple Nuclei Model was developed based on the idea that:
(A) All cities follow a universal pattern of concentric rings.
(B) Transportation corridors are the single most important factor in urban growth.
(C) The central business district is losing its importance in all cities.
(D) A city's land use pattern develops around several distinct centers or nuclei.

77. An increasing dependency ratio in a developed country is most likely caused by:
(A) An aging population and declining birth rates.
(B) A baby boom and high fertility rates.
(C) High levels of immigration of working-age people.
(D) High levels of emigration of retired people.

78. Which of the following is NOT a primary determinant of world population distribution?
(A) Climate
(B) Topography
(C) Political boundaries
(D) Longitude

79. Read the following statements and select the correct option.
Statement I : The rank-size rule provides a good description of the urban hierarchy in countries with a dominant primate city.
Statement II : The primate city rule describes a situation where the largest city is several times larger than the next ranked city.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

80. 'Crime and social exclusion' in the city are often linked to:
(A) The proliferation of high-end shopping districts.
(B) The effective integration of all social groups.
(C) High levels of poverty, inequality, and lack

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(C) Vital error, related to the misreporting of marriage statistics.
(D) Determinant error, arising from incorrect analysis of population patterns.

25. A national policy that provides financial incentives, tax breaks, and extended parental leave to encourage families to have more children is best described as:
(A) An anti-natalist policy
(B) A eugenic policy
(C) A pro-natalist policy
(D) A migration-control policy

26. According to the Sector Model of urban structure proposed by Homer Hoyt, the growth of a city is primarily influenced by:
(A) The path of major transportation routes.
(B) The location of heavy industry.
(C) The outward expansion of concentric rings from the CBD.
(D) The development of multiple growth poles or nuclei.

27. Lewis Mumford's theory on the origin of towns emphasizes the importance of:
(A) Economic and trade revival.
(B) Agricultural surplus.
(C) Military defense and fortifications.
(D) Social institutions and cultural containers.

28. Consider the following statements about the determinants of fertility:
1. Educational level of women is often inversely related to fertility rates.
2. The prevalence of contraceptive use significantly impacts fertility.
3. Urbanization generally leads to an increase in fertility rates.
4. High infant mortality can sometimes contribute to higher fertility.

Which of the above statements are correct?
(A) 1, 2 and 4
(B) 1 and 3 only
(C) 2, 3 and 4
(D) 1, 2, 3 and 4

29. 'Social Area Analysis' in urban geography is primarily concerned with:
(A) Analyzing the functional zones of a city, such as commercial and industrial.
(B) Mapping the physical infrastructure and transport networks.
(C) Identifying residential segregation based on socioeconomic status, family status, and ethnic status.
(D) Studying the political and administrative divisions within a city.

NODIA

30. Which of the following defines 'vital statistics' as a source of population data?
(A) A comprehensive, one-time national count of the entire population within a territory.
(B) The official and continuous registration of births, deaths, marriages, and divorces.
(C) Data collected from a small, representative group of people to make wider inferences.
(D) Official records regarding the movement of individuals across recognized international borders.

31. In the context of Malthusian theory, 'preventive checks' on population growth include:
(A) Famine, disease, and war.
(B) Government-sponsored family planning programs.
(C) Moral restraint, late marriage, and celibacy.
(D) Advances in agricultural technology.

32. Which of the following is NOT a contemporary problem typically faced by rural settlements in developing countries?
(A) Large-scale and persistent migration from rural settlements to major urban centers.
(B) Widespread gentrification caused by urban professionals moving into rural communities.
(C) Significant and rapid changes in traditional land use patterns for local agriculture.
(D) Legal and social issues related to land acquisition for various infrastructure projects.

33. Read the following assertion and reason and select the correct option.
Assertion (A) : In Malthus's theory, 'positive checks' are those that increase the death rate.
Reason (R) : Famines, epidemics, and wars are examples of positive checks that Malthus believed were natural ways of keeping population in balance with the food supply.
(A) Both A and R are true and R is the correct

51. Which of the following is NOT a type of rural settlement pattern?
(A) Linear
(B) Rectangular
(C) Concentric zone
(D) Dispersed

52. The term 'global city' (or world city) emphasizes a city's:
(A) Role as a command and control center in the global economy.
(B) Population size.
(C) Historical significance and architectural heritage.
(D) Administrative function as a national capital.

53. An anti-natalist population policy is designed to:
(A) Encourage higher birth rates.
(B) Increase immigration.
(C) Decrease birth rates.
(D) Promote emigration.

54. The final stage (Stage 4) of the Demographic Transition Model is characterized by:
(A) High birth rate and high death rate.
(B) High birth rate and low death rate.
(C) Low birth rate and high death rate.
(D) Low birth rate and low death rate.

55. Consider the following factors in the context of migration:
1. Political instability and persecution
2. High unemployment rates
3. Better educational opportunities
4. Famine and drought
5. Higher wages in the destination

Which of the above can be categorized as 'push factors'?
(A) 1, 2 and 4
(B) 3 and 5 only
(C) 1, 3 and 4
(D) 2, 3 and 5

56. In urban land use models, the zone immediately surrounding the Central Business District (CBD) in the Burgess model is the:
(A) Zone of better residences.
(B) Zone of transition.
(C) Commuters' zone.
(D) Zone of independent workers' homes.

57. The main argument of Henri Pirenne in his 'Pirenne Thesis' concerning the origin of medieval towns is linked to the:
(A) Decline of the Roman Empire.
(B) Spread of Islam disrupting Mediterranean trade.
(C) Agricultural revolution of the Middle Ages.
(D) Emergence of a new merchant class.

58. Which of the following is an index of fertility?
(A) General Fertility Rate
(B) Crude Death Rate
(C) Infant Mortality Rate
(D) Maternal Mortality Rate

59. Which urban theorist is associated with the concept of the 'necropolis' as a stage in the city's life cycle?
(A) Gordon Childe
(B) Homer Hoyt
(C) Lewis Mumford
(D) Ernest Burgess

60. Read the following assertion and reason and select the correct option.
Assertion (A) : The Demographic Transition Model, based on the experience of Western Europe, may not be universally applicable to all developing countries.
Reason (R) : The social, economic, and cultural contexts of today's developing countries are often different from those of 19th-century Europe.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

61. 'Social exclusion' in an urban context most appropriately refers to the:
(A) Preference of some individuals to live in isolated neighborhoods.
(B) Legal segregation of populations based on income.
(C) Natural tendency for people to form groups based on common interests.
(D) Process by which certain groups are denied

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43. Which of the following is a key difference in the process of urbanization between developed and developing countries?
(A) Urbanization in developed countries occurred at a much faster pace than what is currently observed in developing countries.
(B) Cities in developed countries are growing faster than cities in developing countries.
(C) Urbanization in developing countries is often accompanied by a lower level of industrialization compared to the historical experience of developed nations.
(D) Developed countries have never experienced problems like slums or urban poverty.

44. Which of the following is an example of a consequence of rural-urban migration for the source (rural) area?
(A) Increased pressure on urban infrastructure.
(B) Growth of slums in the city.
(C) Expansion of the urban informal sector.
(D) A change in the age and sex structure of the rural population, often leaving behind the elderly.

45. Consider the following potential issues in population statistics:
1. Age misreporting, where respondents round their age to the nearest zero or five.
2. Deliberate falsification of income or educational attainment.
3. Omission of certain groups, such as the homeless or nomadic populations.
4. Errors in transcribing data from paper forms to digital media.

Which of the above statement(s) represent issues of data reliability and error?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

46. What does the term 'megacity' typically refer to?
(A) A city with a population of over 1 million people.
(B) A city that is a primary node in the global economic network.
(C) A city with a population of 10 million or more inhabitants.
(D) A city that politically dominates its entire country.

47. Michael Sadler's 'Destiny Theory' of population posited that:
(A) Population growth is a universal constant, regardless of conditions.
(B) As the density of a population increases, its fertility tends to decrease.
(C) Population will always grow to the limits of the food supply.
(D) Human population is controlled by the will of a divine power.

48. The growth of slums, crime, and the informal sector are often described as manifestations of:
(A) Urban gentrification.
(B) Sustainable urban development.
(C) Urban poverty and social exclusion.
(D) The success of formal economic planning.

49. Read the following statements and select the correct option.
Statement I : The Harris and Ullman Multiple Nuclei Model suggests that a city may develop around several distinct centers rather than a single CBD.
Statement II : The model is less applicable to modern, complex cities than the simple Burgess model.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

50. Match List I with List II regarding migration concepts and select the correct answer using the codes given below.
List I: (Concept)
P. Push Factor
Q. Pull Factor
R. Intervening Obstacle
S. Step Migration
List II: (Example)
1. Job opportunities in a distant city.
2. A series of shorter moves from a village to a town and then to a city.
3. Lack of employment in a rural area.
4. Lack of money for a long-distance journey.
Codes:
(A) P-3, Q-1, R-4, S-2
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-1, Q-2, R-4, S-3

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17. Read the following statements and select the correct option.

Statement I : David Ricardo's theory suggests that wages will naturally tend toward a subsistence level.

Statement II : He believed that if wages rise above the subsistence level, population would decline due to increased prosperity.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

18. Which of the following best describes the 'threshold' in Central Place Theory?

(A) The minimum number of people required to support a good or service.
(B) The maximum distance a consumer is willing to travel for a good or service.
(C) The geographical boundary of a settlement's influence.
(D) The point at which a city becomes a megacity.

19. Match List I with List II and select the correct answer.

List I: (Population Index)
P. Crude Birth Rate (CBR)
Q. Infant Mortality Rate (IMR)
R. Age-Dependency Ratio
S. Total Fertility Rate (TFR)

List II: (Definition)
1. Average number of children a woman would have in her lifetime.
2. Number of deaths of infants under one year per 1,000 live births.
3. Ratio of non-working age population to working-age population.
4. Number of live births per 1,000 people in a year.

Codes:
(A) P-1, Q-3, R-2, S-4
(B) P-4, Q-2, R-3, S-1
(C) P-4, Q-3, R-1, S-2
(D) P-1, Q-2, R-4, S-3

20. The concept of an 'edge city' includes all of the following characteristics EXCEPT:

(A) It has substantial office and retail space.
(B) It was predominantly rural or residential in character 30 years ago.
(C) It is perceived by the population as a single place.
(D) It is primarily residential with very little commercial activity.

21. Consider the following determinants of population distribution:
1. Climate and terrain
2. Availability of water
3. Soil fertility
4. Mineral resources
5. Government policies

Which of the above are considered determinants of population distribution?
(A) 1, 2 and 3 only
(B) 2, 4 and 5 only
(C) 1, 3 and 4 only
(D) 1, 2, 3, 4 and 5

22. In the context of rural settlements, what does a 'linear' pattern typically signify?

(A) The settlement is located at a crossroads of major trade routes.
(B) The settlement has developed along a road, river, or coastline.
(C) The houses are clustered around a central feature like a pond or a church.
(D) The houses are scattered randomly over a large area with no clear structure.

23. Arrange the following stages of the Demographic Transition Model in the correct chronological sequence:
1. Late Expanding (Stage 3)
2. High Stationary (Stage 1)
3. Low Stationary (Stage 4)
4. Early Expanding (Stage 2)

Select the correct answer from the codes given below:
(A) 2, 4, 1, 3
(B) 1, 2, 3, 4
(C) 2, 1, 4, 3
(D) 4, 2, 1, 3

24. Which statement correctly identifies an error commonly associated with population census data?

(A) Coverage error, such as the undercounting or overcounting of individuals.
(B) Sampling error, which arises from studying a part of the population.

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access to resources, opportunities, and social participation.

62. What is the primary characteristic of a 'dispersed' rural settlement?
(A) Individual farmhouses are scattered across the landscape, separated by farmland.
(B) Houses are clustered tightly together for defense.
(C) Houses are built in a line along a transport artery.
(D) The settlement is planned in a grid-like pattern.

63. The 'law of the primate city' is most likely to be found in a country that:
(A) Has a long history of urban development and a complex economy.
(B) Has multiple large cities of comparable size.
(C) Has a small area and population, and was previously a colonial territory.
(D) Follows a federal system of government with strong regional capitals.

64. Read the following statements and select the correct option.
Statement I : A key trend of urbanization in developing countries is the rapid growth of large metropolitan areas.
Statement II : This trend is primarily driven by rural-to-rural migration.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

65. Consider the following statements regarding the characteristics of population composition:
1. Sex ratio is the number of males per 1000 females, or vice-versa.
2. Age structure is often visualized using a population pyramid.
3. Educational level refers to the average number of years spent in school.
4. Rural-urban composition indicates the proportion of population living in different types of settlements.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 2 and 4 only
(C) 1, 3 and 4 only
(D) 1, 2, 3 and 4

66. What problem is directly addressed by land acquisition and transaction policies in the context of rural settlements?
(A) The natural increase of the rural population.
(B) The conversion of agricultural land for non-agricultural uses like industry or housing.
(C) The decline in traditional rural crafts.
(D) The lack of educational facilities in villages.

67. Which of the following migration models explicitly incorporates the concepts of "intervening obstacles" and "personal factors"?
(A) Ravenstein's Laws of Migration
(B) Lee's Model of Migration
(C) The Gravity Model
(D) Malthus's Migration Theory

68. The "zone of transition" in the Burgess model is characterized by:
(A) A zone of declining housing, immigrant settlements, and encroaching light industry.
(B) An area characterized by high-income families residing in spacious and modern homes.
(C) Well-established and stable middle-class residential areas with consistent property values.
(D) The suburban and exurban communities of commuters located on the city's periphery.

69. In Christaller's Central Place Theory, the 'range' of a good is defined as:
(A) The variety of goods and services available in a central place.
(B) The minimum population needed to support a service.
(C) The maximum distance people are willing to travel to acquire a good.
(D) The physical area of the central place itself.

70. Consider the following population theorists:
1. Michael Sadler
2. David Ricardo
3. Thomas Malthus

Which of the following is the correct chronological sequence of their main contributions?
(A) 3, 2, 1
(B) 1, 2, 3

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explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

34. The rank-size rule, formulated by G.K. Zipf, suggests a relationship between the:
(A) Size and functional complexity of a city.
(B) Distance and interaction between two cities.
(C) Threshold and range of a central place.
(D) Rank and population size of cities in a country.

35. The movement of people from a city center to outlying areas, which may be residential in nature but still economically tied to the city, is known as:
(A) Suburbanization
(B) Urbanization
(C) Gentrification
(D) Counter-urbanization

36. Read the following statements and select the correct option.
Statement I : Migration models, such as Lee's Model, categorize factors causing migration into push and pull factors.
Statement II : Pull factors are negative conditions in the place of origin that encourage people to leave.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

37. August Lösch's model of central places is considered a modification and improvement of Christaller's model because it:
(A) Introduces a perfectly uniform hexagonal lattice structure for all types of consumer goods.
(B) Focuses exclusively on the location of administrative and governmental centers.
(C) Is formulated to be applicable exclusively to modern industrial and manufacturing economies.
(D) Provides a complex arrangement of market areas with sectors of high and low density.

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38. Consider the following characteristics of Stage 3 (Late Expanding) of the Demographic Transition Model:
1. Death rates continue to fall and then stabilize at a low level.
2. Birth rates begin to decline rapidly.
3. The rate of natural increase slows down.
4. Population growth remains explosive and accelerates.
5. Society is predominantly agrarian with high birth and death rates.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 3
(B) 2, 4 and 5
(C) 1, 3 and 5
(D) 2, 3 and 4

39. The informal sector of a city's economy is characterized by:
(A) High wages, job security, and government regulation.
(B) Large multinational corporations with foreign investment.
(C) Activities that are untaxed, unregulated, and often small-scale.
(D) Employment exclusively in high-tech and service industries.

40. According to Henri Pirenne, the revival of which of the following was the primary catalyst for the re-emergence of towns in medieval Europe?
(A) Long-distance trade
(B) Agricultural innovation
(C) Royal decrees
(D) Religious pilgrimages

41. Which measure is used to describe the number of people per unit of arable land?
(A) Arithmetic density
(B) Agricultural density
(C) Economic density
(D) Physiological density

42. A 'satellite town' is best defined as:
(A) A town that grows organically on the immediate edge of a large city.
(B) A planned town, physically separate from a major city but functionally linked to it.
(C) An older town that is eventually engulfed by the expansion of a larger metropolis.
(D) The outermost ring in the Burgess model.

of opportunity.
(D) The expansion of public parks and recreational spaces.

81. Gordon Childe's theory of the "Urban Revolution" identifies which factor as a prerequisite for the emergence of cities?
(A) The development of writing and record-keeping.
(B) The creation of a food surplus through agriculture.
(C) The establishment of long-distance trade networks.
(D) The invention of the wheel.

82. In the context of population policies, China's "one-child policy" is a classic example of:
(A) An anti-natalist policy.
(B) A pro-natalist policy.
(C) A eugenic policy.
(D) A laissez-faire policy.

83. The internal structure of a city, according to the Sector Model, is organized around:
(A) A series of concentric rings.
(B) Pie-shaped wedges radiating from the center.
(C) A random collection of specialized nodes.
(D) A grid pattern dictated by colonial administration.

84. The principal difference between a sample survey and a census is that a sample survey:
(A) Collects data on every individual.
(B) Is typically more expensive and time-consuming.
(C) Is free from all types of errors.
(D) Collects data from a representative subset of the population.

85. Match List I with List II and select the correct answer using the codes given below.
List I: (Policy Description)
P. Offering significant financial bonuses for a third child.
Q. Implementing a strict one-child or two-child limit.
R. Providing easy access to contraception and family planning information.
S. Encouraging immigration of skilled workers to offset a declining workforce.

List II: (Country Context)
1. A developing country with rapid population growth.
2. A developed country with an aging population and low fertility.
3. A developed country with a shrinking native workforce.
4. A common strategy in both developed and developing countries for fertility control.

Codes:
(A) P-2, Q-1, R-4, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-3, R-2, S-1
(D) P-2, Q-4, R-1, S-3

86. A 'ring town' is a settlement that:
(A) Develops in a circular pattern around a central open space.
(B) Is part of a chain of towns encircling a major metropolitan area.
(C) Exists only in theoretical models of urban structure.
(D) Is located at the junction of two major ring roads.

87. Which phenomenon is NOT typically a part of the "manifestation of poverty in the city"?
(A) Growth of slums
(B) Expansion of the informal sector
(C) Increase in crime rates
(D) Widespread gentrification

88. Consider the following indices related to population analysis:
1. Infant Mortality Rate
2. Maternal Mortality Ratio
3. Child Mortality Rate (Under-5)
4. Crude Death Rate

Which of the above are specifically measures of mortality?
(A) 4 only
(B) 1, 2 and 3 only
(C) 1 and 4 only
(D) 1, 2, 3 and 4

89. A city that experiences significant economic, social, and political dominance over its nation, far surpassing any other city, is referred to as:
(A) An edge city
(B) A satellite town
(C) A primate city

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(D) A global city

90. In Stage 2 (Early Expanding) of the Demographic Transition Model, population growth is rapid because:
(A) The birth rate increases and the death rate increases.
(B) The birth rate remains high while the death rate falls sharply.
(C) The birth rate falls sharply while the death rate remains high.
(D) Both the birth rate and the death rate fall, but the death rate falls faster.

91. The concept of the "rural-urban fringe" is best characterized by:
(A) A stable, unchanging landscape.
(B) A clear, sharp boundary between city and countryside.
(C) Mixed land uses and potential land use conflicts.
(D) Homogeneous, high-density residential development.

92. Read the following assertion and reason and select the correct option.
Assertion (A) : The proportion of a country's population living in urban areas is a common indicator of its level of economic development.
Reason (R) : Industrialization and economic development historically lead to a shift of population from rural agricultural areas to urban industrial and service centers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. The primary focus of August Lösch's theory, which distinguishes it from Christaller's, is its emphasis on:
(A) Maximizing administrative control.
(B) The principle of traffic and transport efficiency.
(C) The role of profit maximization for firms, leading to a more complex landscape.
(D) The historical development of cities.

94. What is the main characteristic of a 'compact' rural settlement?
(A) Houses are built close together, often around a central nucleus.
(B) Houses are widely scattered over a large area.
(C) The settlement is temporary and moves seasonally.
(D) It consists of only one or two large farmsteads.

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95. In the context of migration, which of the following is the best example of a 'pull factor'?
(A) Political persecution in the home country.
(B) A natural disaster, such as a major earthquake.
(C) The prospect of higher-paying jobs in another region.
(D) Lack of arable land for farming in the village.

96. Which urban land use model was the first to explicitly recognize the importance of transportation corridors in shaping city structure?
(A) Concentric Zone Model (Burgess)
(B) Sector Model (Hoyt)
(C) Multiple Nuclei Model (Harris and Ullman)
(D) Central Place Theory (Christaller)

97. An error in census data where certain groups of people (e.g., homeless, migrants) are missed is known as:
(A) An error of content
(B) An error of coverage (undercount)
(C) A sampling error
(D) A processing error

98. Read the following statements and select the correct option.
Statement I : Developed countries are generally in the later stages (3 or 4) of the demographic transition.
Statement II : Developing countries are almost all in Stage 1 of the demographic transition.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

99. The study of the spatial distribution of social groups within urban areas is the focus of:
(A) Urban morphology.
(B) Urban ecology.
(C) Urban social area analysis.
(D) Urban political geography.

100. Consider the following potential consequences of an aging population structure in a developed country:
1. Increased pressure on pension and healthcare systems.
2. A shortage of labor in the workforce.
3. A larger proportion of the population being economically productive.
4. A growing market for goods and services targeted at the elderly.
5. A rapid increase in the country's overall population.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 4
(B) 2, 3 and 5
(C) 1, 3 and 4
(D) 3, 4 and 5

101. The transition from high birth and death rates to low birth and death rates as a country develops is known as:
(A) Population momentum
(B) Demographic transition
(C) Natural increase
(D) Urban transition

102. Which theorist argued that the medieval city was a "commercial republic" and its origin was tied to the rise of a merchant class?
(A) Henri Pirenne
(B) Gordon Childe
(C) Lewis Mumford
(D) Ernest Burgess

103. The growth of the 'informal sector' in the cities of developing countries is largely a response to:
(A) The government's relative success in creating formal employment within urban sectors.
(B) A cultural preference for unregulated work over traditional employment structures.
(C) The exceptionally high levels of educational attainment found in the urban population.
(D) The failure of the formal economy to absorb a rapidly growing urban labor force.

104. In contrast to the primate city pattern, the rank-size rule describes an urban system where:
(A) The largest city is twice the size of the second largest.
(B) All cities are approximately the same size.
(C) The population of a city is inversely proportional to its rank.
(D) There is no relationship between the size and rank of cities.

105. Arrange the following stages of the demographic transition in the correct chronological sequence:
1. Low birth rate, low death rate, stable population.
2. High birth rate, declining death rate, rapid population growth.
3. High birth rate, high death rate, stable or slow growth.
4. Declining birth rate, low death rate, slowing population growth.

Select the correct answer from the codes given below:
(A) 3, 2, 4, 1
(B) 2, 3, 1, 4
(C) 3, 4, 2, 1
(D) 1, 2, 3, 4

106. A key feature of an 'edge city' according to Joel Garreau is that it must have:
(A) More jobs than bedrooms.
(B) More bedrooms than jobs.
(C) A traditional, pedestrian-oriented downtown.
(D) A history stretching back over 100 years.

107. Which of the following is NOT a direct cause of "social segregation in the city"?
(A) Differences in income and wealth.
(B) Housing discrimination based on ethnicity or race.
(C) The tendency of people to live near others with similar lifestyles or cultural backgrounds.
(D) The provision of uniform, integrated public housing for all income groups.

108. The main difference between fertility and fecundity is that fertility refers to:
(A) The physiological ability to have children.

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(B) The actual reproductive performance of a population.
(C) The number of children a woman desires to have.
(D) The average age at first marriage.

109. What is a defining characteristic of a 'suburban' area?
(A) It is a high-density, mixed-use neighborhood in the city center.
(B) It is a lower-density residential area on the outskirts of a city.
(C) It is an area of heavy industry and manufacturing.
(D) It is a completely self-sufficient town independent of any major city.

110. Consider the following potential components of an anti-natalist population policy in a developing country:
1. Promoting the use of contraceptives.
2. Raising the legal age of marriage.
3. Providing cash bonuses for having large families.
4. Improving female education and literacy.

Which of the above statements represent typical anti-natalist strategies?
(A) 1, 2 and 4
(B) 1 and 3 only
(C) 2, 3 and 4
(D) 1, 2, 3 and 4

111. What is the fundamental assumption of the concentric zone model?
(A) A city grows outward in a series of rings from a central point.
(B) A city grows along major transportation lines.
(C) A city's growth is unstructured and random.
(D) A city grows around several distinct nodes of activity.

112. The term 'occupational structure' describes the:
(A) Age and sex distribution of a population.
(B) Distribution of the working population among different industries and occupations.
(C) Level of educational attainment within a society.
(D) Rural-urban balance of a country.

113. Read the following statements and select the correct option.
Statement I : Malthus's theory has been criticized for underestimating the potential of technological advancements in food production.
Statement II : The Green Revolution of the 20th century is an example that contradicts Malthus's predictions about arithmetic growth of food supply.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

114. The 'prehistoric to modern period' of world population growth can be characterized by:
(A) Very slow growth for most of human history, followed by exceptionally rapid growth in the last 200 years.
(B) A constant and steady rate of growth throughout history.
(C) A peak in the Middle Ages, followed by a steady decline.
(D) Rapid growth in the prehistoric period and slow growth in the modern period.

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115. A 'rectangular' pattern of rural settlement is often associated with:
(A) Areas of planned settlement, such as on plains with a grid system of roads and fields.
(B) Hilly or mountainous terrain.
(C) Coastal regions where fishing is the main occupation.
(D) Settlements built around a central defensive structure.

116. Which of the following is a key characteristic of the process of urbanization in developed countries?
(A) It is a very recent phenomenon, beginning only in the 21st century.
(B) It was closely linked with the Industrial Revolution.
(C) It is characterized by a higher rate of growth than in developing countries today.
(D) It has led to a majority of the population remaining in rural areas.

117. Which of the following concepts is central to Christaller's theory but not explicitly to Lösch's?
(A) The hexagonal market area.

(B) The concept of threshold and range.
(C) The idea of a hierarchy of central places with fixed k-values (k=3, k=4, k=7).
(D) The assumption of a uniform isotropic plain.

118. 'Land acquisition and transactions' as a contemporary problem in rural settlements primarily involves conflict over:
(A) Traditional inheritance laws regarding the division of land among several heirs.
(B) The conversion of agricultural land for urban or industrial development.
(C) The legal definitions and boundaries of communal lands used by village residents.
(D) The rights to use and manage local water sources for agricultural irrigation.

119. The concept that different ethnic or socioeconomic groups tend to cluster in specific parts of a city is known as:
(A) Urban sprawl.
(B) Functional zonation.
(C) Social segregation.
(D) The informal sector.

120. Consider the following determinants of mortality rates in a population:
1. Availability and quality of healthcare services.
2. Levels of nutrition and sanitation.
3. Prevalence of infectious and non-communicable diseases.
4. Occupational hazards and environmental pollution.
5. Social stability and absence of conflict.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 2, 4 and 5 only
(C) 1, 3 and 5 only
(D) 1, 2, 3, 4 and 5

121. The reliability of population data obtained from a sample survey is highly dependent on:
(A) The total size of the country's population.
(B) How well the selected sample represents the entire population.
(C) The number of questions asked in the survey.
(D) The use of advanced computer technology for analysis.

122. Which theorist viewed the city as a cultural 'container' that facilitates social interaction, innovation, and the transmission of heritage?
(A) Henri Pirenne
(B) Gordon Childe
(C) Lewis Mumford
(D) Walter Christaller

123. The "law of the primate city" is an urban structure in which the largest city is:
(A) Exactly twice as large as the second largest city within the urban hierarchy.
(B) Part of a well-balanced and evenly distributed urban system across the nation.
(C) Disproportionately larger and more significant than other cities in the system.
(D) The designated administrative capital, but not necessarily the primary economic hub.

124. The main driver of urban growth in many developing countries today is:
(A) A combination of natural increase within cities and rural-to-urban migration.
(B) Primarily international migration from developed nations.
(C) Government programs to relocate people from rural areas.
(D) The expansion of agricultural activities into urban areas.

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125. Which of the following is NOT a model of urban land use?
(A) Concentric Zone Model
(B) Sector Model
(C) Demographic Transition Model
(D) Multiple Nuclei Model

126. A population policy in a developed country that offers extended maternity leave, subsidized childcare, and family allowances is an example of a:
(A) Restrictive policy
(B) Anti-natalist policy
(C) Pro-natalist policy
(D) Migration policy

127. The most significant demographic consequence of migration is that it:
(A) Only affects the economic structure of the receiving country.
(B) Always leads to a decrease in the total

Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-2, R-1, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-1, Q-3, R-2, S-4

166. Which type of migration involves movement within a country, such as from one state to another?
(A) International migration
(B) Internal migration
(C) Forced migration
(D) Chain migration

167. Which of the following is NOT one of the three classic variables used in Social Area Analysis?
(A) Socioeconomic status
(B) Family status / Urbanization
(C) Ethnic status / Segregation
(D) Political affiliation

168. Consider the following characteristics of urbanization in developed countries:
1. It was closely tied to the Industrial Revolution.
2. It occurred over a long period, allowing for gradual adaptation.
3. It was primarily driven by the service sector economy from the start.
4. It led to high levels of urban concentration relatively early.
5. It was characterized by a lack of social problems like slums.

Which of the above statement(s) is/are correct?
(A) 1, 2 and 4
(B) 2, 3 and 5
(C) 1, 3 and 4
(D) 3, 4 and 5

169. What is a primary criticism of the Concentric Zone Model?
(A) It overemphasizes the importance of transportation routes.
(B) It is too complex to be easily understood.
(C) It assumes a uniform landscape and does not account for topography or transport corridors.
(D) It is only applicable to cities outside of North America.

170. Read the following assertion and reason and select the correct option.
Assertion (A) : The rank-size rule and the law of the primate city are two different ways of describing a country's urban hierarchy.
Reason (R) : A country cannot simultaneously exhibit a perfect rank-size distribution and have a primate city.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

171. The "functions of urban areas" can be broadly classified into categories such as:
(A) Primary, secondary, and tertiary.
(B) Administrative, economic, cultural, and residential.
(C) Linear, rectangular, and circular.
(D) Ancient, medieval, and modern.

172. The data source that provides the most comprehensive and detailed picture of a country's population but is also the most expensive and infrequent is the:
(A) Vital statistics system
(B) Sample survey
(C) National census
(D) Migration registry

173. What is the main idea of David Ricardo's "iron law of wages" in relation to population?
(A) In the long run, wages will always tend toward the minimum level necessary for subsistence.
(B) Increased wages will lead to a better quality of life for the working class.
(C) Technology will always increase wages for all workers.
(D) Wages are determined by government policy alone.

174. A settlement pattern where houses are constructed along a physical feature like a riverbank, levee, or road is called:
(A) A dispersed pattern
(B) A nuclear pattern
(C) A circular pattern
(D) A linear pattern

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136. The stage in the Demographic Transition Model where the birth rate and death rate are both low and stable is:
(A) Stage 1
(B) Stage 4
(C) Stage 2
(D) Stage 3

137. Which of these is a measure of population distribution?
(A) Total Fertility Rate
(B) Population Density
(C) Natural Growth Rate
(D) Sex Ratio

138. Arrange the following models of urban structure in the correct chronological order of their appearance:
1. Multiple Nuclei Model
2. Sector Model
3. Concentric Zone Model

Select the correct answer from the codes given below:
(A) 1, 2, 3
(B) 3, 2, 1
(C) 2, 3, 1
(D) 3, 1, 2

139. What is a key function of 'vital statistics' registration systems?
(A) To provide a snapshot of the population on a single day.
(B) To provide a continuous record of demographic events like births and deaths.
(C) To study a small group to make inferences about the whole population.
(D) To map the internal structure of cities.

140. Match List I with List II and select the correct answer using the codes given below.
List I: (Urban Form)
P. Peri-urban area
Q. Suburban area
R. Satellite town
S. Rural-urban fringe
List II: (Description)
1. A largely residential area on the immediate outskirts of a city, often with commuting population.
2. A planned, self-contained town separate from but linked to a larger city.
3. The transitional zone characterized by a mixture of urban and rural land uses.
4. A dynamic zone of rapid change and development beyond the immediate suburbs.

Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-3, Q-2, R-1, S-4
(D) P-4, Q-2, R-1, S-3

141. Read the following assertion and reason and select the correct option.
Assertion (A) : The informal sector provides crucial employment for a large number of urban dwellers in developing countries.
Reason (R) : The formal economy in these countries grows fast enough to absorb all new entrants to the urban labor force.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

142. The world's population distribution is best described as:
(A) Evenly spread across all continents.
(B) Concentrated in the southern hemisphere.
(C) Highly uneven, with concentrations in a few major clusters.
(D) Primarily located in polar and desert regions.

143. Consider the following issues in the context of rural settlements:
1. Depopulation due to rural-urban migration.
2. Changes in land use from agriculture to industry or housing.
3. Issues surrounding land acquisition for development projects.
4. Lack of basic infrastructure and services.
5. An oversupply of high-paying jobs.

Which of the above are considered contemporary problems of rural settlements?
(A) 1, 2, 3 and 4
(B) 2, 3, 4 and 5
(C) 1, 3 and 5 only
(D) 1, 2 and 5 only

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population of the planet.
(C) Changes the age, sex, and ethnic composition of both the source and destination areas.
(D) Has no impact on the demographic characteristics of either area.

128. Match List I with List II and select the correct answer using the codes given below.
List I: (Model)
P. Concentric Zone Model
Q. Sector Model
R. Multiple Nuclei Model
S. Central Place Theory
List II: (Proponent)
1. Homer Hoyt
2. Harris and Ullman
3. Ernest Burgess
4. Walter Christaller
Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-4, Q-2, R-1, S-3
(C) P-3, Q-2, R-4, S-1
(D) P-1, Q-3, R-2, S-4

129. What does the term 'educational levels' refer to in the context of population characteristics?
(A) The number of schools in a country.
(B) The quality of teaching staff.
(C) The distribution of the population according to the highest level of education completed.
(D) The amount of government spending on education.

130. A major cause of crime in cities, from a geographical perspective, is often linked to:
(A) The high density of cultural institutions.
(B) The presence of well-lit and well-policed public spaces.
(C) Stark spatial inequalities, poverty, and social exclusion.
(D) The efficient functioning of the formal economy.

131. Read the following assertion and reason and select the correct option.
Assertion (A) : Global cities are identified as key command and control centers in the new international division of labor.
Reason (R) : They concentrate high-level corporate headquarters, financial institutions, and advanced producer services that manage and coordinate the global economy.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

132. The theory of Michael Sadler suggests an inverse relationship between:
(A) Population density and fertility.
(B) Population density and mortality.
(C) Economic status and mortality.
(D) Education level and migration.

133. Consider the following statements about Lewis Mumford's theory on the origin of towns:
1. He emphasized the role of the king and the citadel.
2. He viewed the city primarily as an economic machine.
3. He saw the early city as a "container" of culture and social life.
4. He largely ignored the spiritual and religious aspects of urban origins.
Which of the above statements are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 2 and 3
(D) 2, 3 and 4

134. Which of the following is a trend of urbanization in developing countries?
(A) Slow and steady growth of small towns.
(B) The growth of megacities and primate cities is a dominant feature.
(C) The rate of urbanization has started to decline significantly.
(D) Urban growth is well-planned and evenly distributed across the country.

135. The 'rural-urban migration' is a major factor contributing to:
(A) The process of urbanization, especially in developing countries.
(B) The aging of the population in urban areas.
(C) The decrease in urban poverty.
(D) The balanced development between rural and urban regions.

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1. Inadequate access to safe water and sanitation.
2. Overcrowding and high density of dwellings.
3. Insecure residential status or tenure.
4. Dwellings of a permanent and durable nature.

Which of the above statements are characteristic of slums?
(A) 1, 2 and 3
(B) 2 and 4 only
(C) 1, 3 and 4
(D) 1, 2, 3 and 4

156. In the Demographic Transition Model, the phase of 'population explosion' occurs during:
(A) Stage 1
(B) Stage 2
(C) Stage 3
(D) Stage 4

157. Which of the following is NOT a type of rural settlement?
(A) Compact
(B) Hamlet
(C) Megalopolis
(D) Dispersed

158. The analysis of a population's age and sex composition is most commonly done using a:
(A) Population Pyramid
(B) Pie Chart
(C) Line Graph
(D) Scatter Plot

159. The main difference between a satellite town and a suburb is that a satellite town:
(A) Is located closer to the central city.
(B) Is primarily a residential-only area.
(C) Has its own economic base and is more independent.
(D) Grows organically without any planning.

160. Which theorist is most associated with the idea that the "revival of long-distance trade" was the key factor in the origin of medieval European towns?
(A) Gordon Childe
(B) Lewis Mumford
(C) Henri Pirenne
(D) David Ricardo

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161. The process of 'social exclusion' in a city can lead to:
(A) Greater social cohesion and integration.
(B) The formation of marginalized communities with limited access to services.
(C) Equal opportunities for all urban residents.
(D) A reduction in urban crime rates.

162. An 'edge city' is typically located:
(A) Near a major airport or at the intersection of highways on the outskirts of a larger city.
(B) In the historical center of a metropolis.
(C) In a remote rural area far from any urban influence.
(D) As an isolated island community.

163. A population policy that focuses on improving female literacy and employment opportunities often has the indirect effect of:
(A) Increasing fertility rates.
(B) Lowering fertility rates.
(C) Increasing mortality rates.
(D) Having no effect on demographic variables.

164. Read the following statements and select the correct option.
Statement I : Urbanization is the process of a country's population becoming increasingly concentrated in cities.
Statement II : The level of urbanization is highest in Africa and Asia.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

165. Match List I with List II and select the correct answer using the codes given below.
List I: (Concept)
P. Central Place
Q. Threshold
R. Range
S. Central Good/Service
List II: (Definition)
1. The maximum distance a consumer will travel for an item.
2. The minimum market size needed for a service to be profitable.
3. A settlement that provides goods and services for its surrounding area.
4. An item or service offered by a central place.

(D) From a country to another country.

186. Which of the following factors is a primary determinant of population distribution on a global scale?
(A) International political alliances.
(B) The location of major rivers and coastal plains.
(C) The distribution of internet access.
(D) The pattern of airline routes.

187. The model that explains urban land use in terms of pie-shaped wedges is the:
(A) Concentric Zone Model.
(B) Sector Model.
(C) Multiple Nuclei Model.
(D) Central Place Model.

188. In Stage 3 of the Demographic Transition, the rate of population growth begins to slow down because:
(A) The death rate starts to increase again.
(B) The birth rate begins to decline significantly.
(C) Emigration increases dramatically.
(D) The food supply diminishes.

189. Read the following statements and select the correct option.
Statement I : The "informal sector" includes all economic activities, enterprises, and jobs that are regulated and taxed by the state.
Statement II : This sector is a negligible part of the economy in most cities of developing countries.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

190. Match List I with List II and select the correct answer using the codes given below.
List I: (Theorist)
P. Gordon Childe
Q. Henri Pirenne
R. Lewis Mumford
S. Ernest Burgess
List II: (Contribution)
1. Emphasized the city as a cultural and social container.
2. Linked urban origins to the revival of trade and the merchant class.
3. Described the "Urban Revolution" following the agricultural revolution.
4. Modeled the internal social structure of the modern industrial city.
Codes:
(A) P-3, Q-2, R-1, S-4
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-4, Q-1, R-2, S-3

191. A key difference between Christaller's and Lösch's central place models is that Lösch's model:
(A) Is designed to be much simpler and more rigid than the previous models proposed.
(B) Does not utilize the hexagonal shape for the representation of market areas.
(C) Allows for a complex and economically rational landscape without a strict hierarchy.
(D) Focuses exclusively on the location of administrative and governmental centers.

192. Which of the following is NOT a consequence of rural-urban migration for the destination city?
(A) Increased demand for housing and infrastructure.
(B) Growth of the labor force.
(C) Increased cultural diversity.
(D) Depopulation of the urban area.

193. The concept of the 'rural-urban fringe' is characterized by:
(A) A mixture of urban and rural land uses and rapid transformation.
(B) A sharp, clearly defined administrative boundary.
(C) A static and unchanging land use pattern.
(D) A landscape dominated exclusively by agricultural activities.

194. A government program offering free contraceptives and promoting small family norms is an example of:
(A) A pro-natalist policy.
(B) An anti-natalist policy.
(C) A laissez-faire approach.
(D) An expansionist policy.

195. Consider the following manifestations of social exclusion in a city:
1. Gated communities separating the wealthy

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175. One of the major consequences of land acquisition in rural areas for urban expansion is the:
(A) Displacement of farmers and loss of agricultural livelihoods.
(B) Increase in agricultural productivity.
(C) Preservation of traditional rural lifestyles.
(D) Decrease in rural-urban migration.

176. Which of the following urban phenomena is a direct manifestation of poverty and lack of formal employment?
(A) The growth of gated communities.
(B) The expansion of the informal sector.
(C) The renovation of historic downtown districts.
(D) The increase in the number of museums and art galleries.

177. The Multiple Nuclei model, proposed by Harris and Ullman, suggests that cities grow from:
(A) Several independent growth centers or nodes.
(B) A single central core.
(C) A series of concentric rings.
(D) The outer edges inward.

178. What was a key component of Gordon Childe's theory of the "Urban Revolution"?
(A) The development of specialized, non-agricultural occupations.
(B) The revival of trade after a dark age.
(C) The cultural and symbolic role of the city.
(D) The importance of transportation routes.

179. A high sex ratio (more males than females) in a country's population might be an indicator of:
(A) A history of female infanticide or neglect.
(B) Large-scale immigration of male guest workers.
(C) Both A and B.
(D) A higher life expectancy for women.

180. Consider the following statements about a satellite town:
1. It is a planned community.
2. It is physically separated from the main city by a greenbelt or open land.
3. It possesses its own economic base and employment.
4. It is merely a residential suburb with no independent character.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 2, 3 and 4 only

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181. According to Christaller's Central Place Theory, which principle results in the most efficient network of routes and the smallest number of central places?
(A) The marketing principle (k=3)
(B) The traffic principle (k=4)
(C) The administrative principle (k=7)
(D) The social principle (k=9)

182. The reliability of population data can be compromised by:
(A) The use of clear definitions and standardized questions.
(B) High response rates and public cooperation.
(C) Intentional misreporting by respondents or errors in data processing.
(D) Conducting the census at regular intervals.

183. Which of the following statements about urban slums is incorrect?
(A) They are a common feature of rapidly urbanizing cities in developing countries.
(B) Residents often have insecure tenure and face the threat of eviction.
(C) They are characterized by excellent access to public services like water and sanitation.
(D) They often house a significant portion of the urban workforce, particularly in the informal sector.

184. The prehistoric period of human history was characterized by:
(A) Very low population numbers and extremely slow growth.
(B) Extremely rapid population growth.
(C) The world's first cities and empires.
(D) A global population of over one billion people.

185. The term 'suburbanization' describes the movement of people and activities:
(A) From the central city to its outskirts.
(B) From rural areas to the central city.
(C) From one city to another.

144. Ricardo's theory of population is intertwined with his economic theory of:
(A) Comparative advantage
(B) The invisible hand
(C) Consumer surplus
(D) The law of diminishing returns and wages

145. "Slums" are urban residential areas characterized by:
(A) Overcrowding, substandard housing, and insecure tenure.
(B) Well-planned infrastructure and high property values.
(C) A high concentration of corporate offices and financial institutions.
(D) Low population density and large green spaces.

146. A major limitation of Malthus's theory was its failure to anticipate:
(A) The natural and innate desire of human populations to have multiple children.
(B) The potential impact of major global conflicts, wide-scale wars, and famines.
(C) The existence of systemic poverty and economic inequality in modern society.
(D) The roles of agricultural technology and contraception in reducing fertility rates.

147. A "megacity" is defined by the United Nations as a city with a population exceeding:
(A) 1 million
(B) 5 million
(C) 10 million
(D) 20 million

148. Read the following statements and select the correct option.
Statement I : The Demographic Transition Theory is a universal law that all countries must follow in the same way and over the same time period.
Statement II : The theory describes the historical shift from high to low mortality and fertility rates experienced by many countries during modernization.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

149. The process by which the social characteristics of a neighborhood change as higher-income groups move in and displace lower-income residents is called:
(A) Suburbanization
(B) Social segregation
(C) Gentrification
(D) Urban sprawl

150. According to the Multiple Nuclei Model, why do certain activities cluster together?
(A) Because the city government mandates their location.
(B) Because they benefit from agglomeration economies or are mutually supportive.
(C) Because of the historical significance of the location.
(D) Because of purely random chance.

151. Which is an example of an 'incorrect pair' regarding urban models?
(A) Burgess - Concentric Zones
(B) Hoyt - Sectors
(C) Harris and Ullman - Multiple Nuclei
(D) Christaller - Primate City

152. The 'graying' of a population refers to:
(A) An increase in the proportion of elderly people.
(B) An increase in the proportion of young children.
(C) A decline in the overall population size.
(D) A high level of air pollution.

153. One of the main purposes of a population census is to provide a framework for:
(A) International diplomacy.
(B) Conducting more detailed sample surveys.
(C) Establishing daily weather forecasts.
(D) Regulating stock markets.

154. The concept of 'urbanism as a way of life', focusing on the social and psychological impacts of city living, was famously articulated by:
(A) Ernest Burgess
(B) Lewis Mumford
(C) Homer Hoyt
(D) Louis Wirth

155. Consider the following characteristics often used to describe slums:

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from the poor.
2. Poor access to quality education and healthcare for residents of certain neighborhoods.
3. Spatial concentration of ethnic minorities in specific, often disadvantaged, areas.
4. Unequal policing and provision of municipal services.
5. Well-integrated public spaces used by all social classes.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3 and 4
(B) 2, 3, 4 and 5
(C) 1, 3 and 5 only
(D) 1, 2 and 5 only

196. Which factor of urban growth refers to the increase in the number and extent of cities?
(A) Urbanism
(B) Urbanization
(C) Urban system
(D) Urban hierarchy

197. The first stage of the Demographic Transition is characterized by:
(A) Low birth rates and low death rates.
(B) High birth rates and low death rates.
(C) High birth rates and high, fluctuating death rates.
(D) Low birth rates and high death rates.

198. The main feature of a 'dispersed' or 'scattered' rural settlement pattern is:
(A) Houses are tightly packed together for social and defensive reasons.
(B) The settlement follows the line of a road or river.
(C) Individual farmhouses are spread out, separated by their fields.
(D) The settlement is organized in a grid-like pattern.

199. "Data reliability" in a population census refers to:
(A) The speed with which the data is published.
(B) The degree to which the data is accurate, complete, and free from errors.
(C) The number of questions asked on the census form.
(D) The level of public interest in the census results.

200. Read the following assertion and reason and select the correct option.
Assertion (A) : Urban Social Area Analysis reveals that residential patterns in many cities are not random.
Reason (R) : People tend to be sorted into different residential areas based on their socioeconomic status, family stage, and ethnicity, creating a segregated urban landscape.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

201. Which of the following represents a 'pull' factor in migration?
(A) War and conflict
(B) Higher wages and job prospects
(C) High unemployment
(D) Poor educational facilities

202. The Sector Model of urban growth is particularly noted for its emphasis on the role of:
(A) High-rent residential areas in shaping the city's growth direction.
(B) The central business district as the sole growth pole.
(C) Industrial zones in repelling residential development.
(D) The natural aging process of neighborhoods.

203. The term 'Primate City' was coined by:
(A) George Zipf
(B) Mark Jefferson
(C) Walter Christaller
(D) Ernest Burgess

204. Contemporary problems of rural settlements include all of the following EXCEPT:
(A) Out-migration of the young and able-bodied population.
(B) Conversion of agricultural land for non-agricultural purposes.
(C) A surplus of employment opportunities and rising rural wages.
(D) Lack of access to modern amenities and services.

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248. Arrange the following concepts of large urban agglomerations in the general chronological sequence of their emergence and recognition:
1. Global City
2. Megacity
3. Metropolis

Select the correct answer from the codes given below:
(A) 1, 2, 3
(B) 3, 2, 1
(C) 2, 3, 1
(D) 3, 1, 2

249. "Contemporary problems of rural settlements" often include which of the following?
(A) Over-urbanization within the settlement.
(B) A brain drain due to rural-urban migration.
(C) Excessive job growth and wage inflation.
(D) The preservation of traditional land use patterns against all odds.

250. The model that describes a city as a series of concentric rings is attributed to:
(A) Ernest Burgess
(B) Homer Hoyt
(C) Harris and Ullman
(D) Walter Christaller

Direction : Please read the following source carefully.

The foundation of population geography rests upon the acquisition and analysis of demographic data, primarily derived from three key sources: the census, sample surveys, and vital statistics registration systems. The census, a comprehensive enumeration of a country's entire population at a specific time, provides a detailed snapshot of demographic, social, and economic characteristics. However, its high cost, complexity, and periodic nature (often decennial) are significant limitations. To bridge the gap between censuses, sample surveys are employed. These surveys collect data from a representative subset of the population, offering more detailed and timely information on specific issues, though they are susceptible to sampling errors. The third source, vital statistics, involves the continuous registration of births, deaths, marriages, and divorces. While providing crucial data for calculating fertility and mortality rates, the reliability of vital statistics systems varies globally, with many developing countries facing challenges of under-registration and data inaccuracy. The interplay of these sources is critical, yet geographers must remain vigilant about potential data reliability and errors, such as coverage errors (over- or under-counting) and content errors (inaccurate information), which can significantly impact the validity of demographic analysis and policy-making.

Based on the above source, attempt the following five questions.

251. Which of the following is described as a primary limitation of a national census?
(A) Its susceptibility to sampling errors
(B) Its high cost and infrequent, periodic nature
(C) Its continuous and dynamic data collection
(D) Its focus solely on vital events like births and deaths

252. What is the principal advantage of using sample surveys for population data collection as compared to a census?
(A) They offer more timely and detailed information on specific topics
(B) They provide a complete enumeration of the entire population
(C) They are free from any form of data collection errors
(D) They replace the need for a vital statistics registration system

253. According to the text, a major challenge affecting the reliability of vital statistics in many developing countries is:
(A) The over-registration of vital events
(B) The lack of representative population subsets
(C) The issue of under-registration and data inaccuracy
(D) The decennial frequency of data collection

254. The passage identifies "coverage errors" and "content errors" as issues that can impact the validity of demographic analysis. These errors are associated with which aspect of population data?
(A) Data patterns
(B) Data determinants
(C) Data transition
(D) Data reliability

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P. Social Segregation
Q. Informal Sector Growth
R. Land Use Changes
S. Rural-Urban Migration

List II: (Description)

1. The conversion of farmland on the urban fringe to housing estates.
2. The concentration of different socioeconomic groups in different neighborhoods.
3. The influx of people from the countryside to cities seeking work.
4. The proliferation of unregulated small-scale businesses and street vending.

Codes:
(A) P-1, Q-3, R-4, S-2
(B) P-2, Q-4, R-1, S-3
(C) P-2, Q-1, R-3, S-4
(D) P-3, Q-4, R-2, S-1

216. A primary cause of change in land use in areas surrounding cities is:
(A) The process of desertification.
(B) The expansion of the city, or urban sprawl.
(C) A decline in the urban population.
(D) A government policy to promote agriculture.

217. In the context of population, the 'occupational structure' is a key indicator of:
(A) The level of economic development.
(B) The sex ratio of the population.
(C) The age of the population.
(D) The fertility rate of the population.

218. The theorist who linked the origin of cities to the agricultural surplus of the "Neolithic Revolution" was:
(A) Henri Pirenne
(B) Gordon Childe
(C) Lewis Mumford
(D) Homer Hoyt

219. "Manifestation of poverty in the city" would include all of the following EXCEPT:
(A) The presence of slums.
(B) High rates of crime.
(C) The growth of the informal sector.
(D) The expansion of high-quality public infrastructure in all neighborhoods.

220. If a country's largest city has 10 million people, its second-largest has 5 million, and its third-largest has 3.3 million, this pattern approximates the:
(A) Law of the Primate City
(B) Rank-Size Rule
(C) Central Place Theory
(D) Sector Model

221. A major determinant of world population patterns is:
(A) The availability of freshwater.
(B) The location of international airports.
(C) The distribution of time zones.
(D) The presence of national parks.

222. The term 'global city' emphasizes a city's function as a:
(A) Tourist destination.
(B) Node in the global economic system.
(C) Center of political power.
(D) Densely populated area.

223. What does Stage 2 of the Demographic Transition Model signify?
(A) A period of high birth rates and high death rates.
(B) A period of rapid population growth.
(C) A period of population decline.
(D) A period of stable population at a low level.

224. One of the main challenges associated with rapid urbanization in developing countries is:
(A) A shrinking labor force.
(B) The inability of infrastructure and services to keep pace with population growth.
(C) A decrease in economic opportunities.
(D) The depopulation of cities.

225. Read the following assertion and reason and select the correct option.
Assertion (A) : Peri-urban areas are often zones of intense land-use conflict.
Reason (R) : Competing demands for land from agriculture, housing, industry, and infrastructure development converge in these transitional zones.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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226. Which theorist proposed a model of urban land use based on wedges or sectors radiating from the city center?
(A) Ernest Burgess
(B) Homer Hoyt
(C) Chauncy Harris
(D) Edward Ullman

227. The most basic distinction in population composition is:
(A) Age and sex
(B) Occupation and education
(C) Rural and urban
(D) Nationality and ethnicity

228. "Social exclusion" in an urban setting refers to the:
(A) Voluntary choice of individuals to live in isolation.
(B) Process by which certain groups are denied full participation in society.
(C) Natural outcome of urban diversity.
(D) Government policy of creating exclusive residential zones.

229. A key assumption of Central Place Theory is that the primary purpose of a settlement is to:
(A) Be a center for industrial manufacturing.
(B) Be a seat of political power.
(C) Provide goods and services to its surrounding population.
(D) Serve as a residential community for commuters.

230. Consider the following recognized functions of urban areas:
1. Commercial and economic activities.
2. Administrative and governmental functions.
3. Cultural and educational centers.
4. Residential space for the population.
5. Primarily agricultural production.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3 and 4
(B) 1, 3 and 5 only
(C) 2, 4 and 5 only
(D) 1, 2 and 5 only

231. Which of these is NOT a source of population data?
(A) Census
(B) Sample Surveys
(C) Vital Statistics
(D) GDP per capita

232. Malthus's theory on population primarily focuses on the relationship between population growth and:
(A) Resource supply
(B) Political freedom
(C) Social structure
(D) Urbanization

233. The 'internal structure of the city' is a topic that would most likely involve the study of:
(A) International migration patterns.
(B) The models of Burgess, Hoyt, and Harris & Ullman.
(C) The demographic transition.
(D) Rural settlement types.

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234. In the Demographic Transition Model, what is the primary reason for the decline in the death rate in Stage 2?
(A) A decrease in the birth rate.
(B) Improvements in public health, sanitation, and food supply.
(C) A mass emigration of the elderly population.
(D) Government policies forcing people to live longer.

235. The concept of a 'megacity' is based on a threshold of:
(A) Functional importance
(B) Population size
(C) Economic output
(D) Geographical area

236. A 'satellite town' differs from a 'suburb' in that it is typically:
(A) Closer to the city center and less independent.
(B) More planned and has a distinct economic base.
(C) Entirely residential with no commercial activity.
(D) An unplanned, organic outgrowth of the city.

237. The 'rank-size rule' is a concept used to describe the hierarchy within a(n):
(A) Urban system
(B) Single city

(C) Rural settlement
(D) Population pyramid

238. Read the following statements and select the correct option.
Statement I : Social segregation in cities is solely an economic phenomenon.
Statement II : Urban social area analysis often examines the distribution of populations by socioeconomic, family, and ethnic status.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

239. The most significant factor contributing to urbanization in developed countries during the 19th and 20th centuries was:
(A) The Green Revolution
(B) The Information Technology Revolution
(C) The Industrial Revolution
(D) A government mandate

240. Match List I with List II and select the correct answer using the codes given below.
List I: (Urban Concept)
P. Megacity
Q. Global City
R. Edge City
S. Satellite Town
List II: (Key Feature)
1. A node of economic activity on the fringe of a metropolis.
2. Defined by a population of over 10 million.
3. A planned town with its own identity, near a large city.
4. A command center in the world economy.
Codes:
(A) P-2, Q-4, R-1, S-3
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-3, R-4, S-1
(D) P-4, Q-1, R-2, S-3

241. The main premise of the Harris and Ullman multiple nuclei model is that:
(A) A city grows in a series of rings.
(B) A city grows in sectors along transport lines.
(C) A city's layout is centered around several distinct nodes.
(D) All cities have a single, dominant CBD.

242. Which of the following is NOT a type of migration?
(A) Internal
(B) International
(C) Sedentary
(D) Forced

243. The "changing urban forms" such as peri-urban areas and rural-urban fringes are most characterized by:
(A) A stable and well-defined landscape.
(B) A dynamic and often chaotic mix of land uses.
(C) A complete absence of population.
(D) A dominance of historical preservation.

244. The theory of population growth proposed by Malthus has been criticized for:
(A) Overestimating the role of technology.
(B) Underestimating human ingenuity and technological advances.
(C) Accurately predicting the future of all countries.
(D) Being too optimistic about the food supply.

245. A country experiencing a high birth rate and a rapidly falling death rate is in which stage of the Demographic Transition?
(A) Stage 1
(B) Stage 2
(C) Stage 3
(D) Stage 4

246. What is the fundamental difference between a rural and an urban settlement?
(A) The size of the population.
(B) The predominant economic activities of the population.
(C) The presence of a local government.
(D) The quality of the housing.

247. What does the term "urban system" refer to?
(A) The internal land use structure of a single city.
(B) The set of interdependent cities and towns within a region or country.
(C) The infrastructure network of a city, like roads and sewers.
(D) The political organization of a city government.

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205. Consider the following factors related to the growth of large urban forms:
1. The decentralization of office and retail functions from the central city.
2. Increased personal mobility due to the automobile.
3. The development of major highway interchanges.
4. A historical preference for dense, walkable urban cores.

Which of the above have contributed to the growth of edge cities?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 2, 3 and 4 only

206. A person who is forced to flee their home but remains within their country's borders is known as:
(A) An asylum seeker
(B) A refugee
(C) An internally displaced person (IDP)
(D) An economic migrant

207. According to Lewis Mumford, the earliest form of the city was the:
(A) Eopolis, arising from a village.
(B) Metropolis, a large and complex city.
(C) Necropolis, the city of the dead.
(D) Tyrannopolis, a parasitic city.

208. The 'size, structure and functions of urban areas' are key components in the study of:
(A) Population composition.
(B) Urban systems and geography.
(C) Rural settlement patterns.
(D) Migration theories.

209. What is the key assumption that underlies both Christaller's and Lösch's central place theories?
(A) A varied landscape with mountains and rivers.
(B) An isotropic plain with uniform population and purchasing power.
(C) A society dominated by industrial production.
(D) A population that is unwilling to travel for goods.

210. A country with a population pyramid that is wider at the top than at the bottom indicates:
(A) A declining population with a large elderly cohort.
(B) A very young population.
(C) A rapidly growing population.
(D) A stable population with zero growth.

211. The term 'peri-urban' describes areas that are:
(A) Located in the very center of the city.
(B) Characterized by a mix of rural and urban features and are undergoing rapid change.
(C) Fully rural with no urban influence.
(D) Old, established suburbs with stable populations.

212. Which of the following best describes the 'informal sector'?
(A) Economic activities that are unregulated and often go unrecorded.
(B) A sector of the economy that is officially recorded, taxed, and monitored.
(C) Large-scale industrial manufacturing.
(D) The financial services industry in global cities.

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213. The Multiple Nuclei Theory posits that land use patterns are organized around multiple growth points because:
(A) The government plans cities that way.
(B) Different activities have different location needs and some are incompatible.
(C) All commercial activities want to be in the center.
(D) Transportation is irrelevant to a city's structure.

214. Read the following statements and select the correct option.
Statement I : A census is a sample survey of the population.
Statement II : Vital statistics provide data on events such as births, deaths, and marriages.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

215. Match List I with List II and select the correct answer using the codes given below.
List I: (Urban Problem)

255. Based on the information provided, what is the primary function of a vital statistics registration system?
(A) To provide a decennial snapshot of a country's population characteristics
(B) To conduct detailed studies on a representative subset of the population
(C) To continuously record key demographic events like births and deaths
(D) To serve as the most cost-effective method of population counting

Direction : Please read the following source carefully.

The Demographic Transition model provides a framework for understanding population growth and change by linking it to stages of socio-economic development. It conceptualizes a historical shift from a pre-industrial equilibrium of high birth and high death rates to a post-industrial equilibrium of low birth and low death rates. The transition itself is characterized by distinct stages. The first stage, typical of pre-modern societies, sees high and fluctuating birth and death rates, resulting in minimal population growth. The second stage begins with a sharp decline in mortality, primarily due to improvements in public health, sanitation, and food supply, while birth rates remain high, leading to a period of rapid population explosion. In the third stage, birth rates begin to fall, influenced by factors like urbanization, increased education (especially for women), and access to contraception, causing the rate of population growth to decelerate. The fourth stage is marked by low birth and death rates, with population growth stabilizing or even beginning to decline. While this model is a useful generalization based on the experience of developed countries, its universal applicability to developing countries, which are experiencing the transition under different social and economic conditions, is a subject of ongoing academic debate.

Based on the above source, attempt the following five questions.

256. According to the Demographic Transition model, which stage is characterized by a rapid population explosion?
(A) The first stage, with high birth and high death rates
(B) The second stage, with declining mortality and high fertility
(C) The third stage, with decelerating birth rates
(D) The fourth stage, with low birth and low death rates

257. The primary driver for the decline in the death rate at the beginning of the demographic transition is identified as:
(A) A spontaneous decrease in the birth rate
(B) The widespread adoption of family planning
(C) A decline in rural-to-urban migration
(D) Improvements in public health, sanitation, and food supply

258. In which stage of the Demographic Transition model does the rate of population growth begin to slow down?
(A) Stage three, due to a fall in birth rates
(B) Stage one, due to fluctuating death rates
(C) Stage two, due to a sharp fall in death rates
(D) Stage four, due to stabilization of birth and death rates

259. The passage suggests that the Demographic Transition model's framework is based on the historical experience of which group of countries?
(A) Countries with a stable population size
(B) Developing countries experiencing rapid growth
(C) Developed countries that have completed the transition
(D) Pre-industrial societies with minimal growth

260. What factor is mentioned as contributing to the decline of birth rates in the third stage of the demographic transition?
(A) Increased urbanization and education
(B) A resurgence of infectious diseases
(C) A decline in food security
(D) A return to agrarian lifestyles

Direction : Please read the following source carefully.

Classical theories of population growth offer foundational, albeit often contrasting, perspectives on the relationship between population and resources. The Malthusian theory, proposed by Thomas Malthus, posits a pessimistic outlook,

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(D) A population with a high proportion of tertiary sector workers

272. According to the passage, a society's economic maturity can be strongly indicated by its:
(A) Rural-urban population ratio only
(B) Occupational structure, particularly the shift between sectors
(C) Age-sex structure and its dependency ratio
(D) Total population size and geographic distribution

273. The transition of a workforce from being predominantly in the primary sector to the tertiary sector indicates:
(A) A decline in educational levels
(B) An increase in the rural population
(C) A return to subsistence-level living
(D) A process of economic transformation and development

274. Which aspect of population composition is described as a crucial measure of human capital influencing productivity and social mobility?
(A) Educational levels
(B) Sex ratio
(C) Rural-urban distribution
(D) Age structure

275. The passage suggests that a high proportion of urban population in a country generally correlates with:
(A) A dominance of the primary economic sector
(B) A high rate of natural population increase
(C) A higher level of industrialization and economic development
(D) A low level of human capital

Direction : Please read the following source carefully.

Rural settlements form the basic fabric of human occupance in many parts of the world, exhibiting distinct types, patterns, and distributions. The major types are broadly classified as compact (or nucleated) and dispersed (or scattered). Compact settlements feature houses clustered together, often surrounded by farmland, promoting community cohesion and defense, while dispersed settlements consist of isolated farmsteads spread over a wide area, typical of regions with extensive agriculture. Settlement patterns, the geometric arrangement of houses and structures, can be linear (along a road or river), circular (around a central feature like a pond or temple), or rectangular, often reflecting physical or cultural controls. However, contemporary rural settlements face a host of profound problems. One of the most significant is persistent rural-urban migration, which drains villages of their younger, more dynamic population. Concurrently, these areas are witnessing rapid land use changes, driven by factors like agricultural modernization and urban expansion. The processes of land acquisition and transactions, often for industrial or infrastructure projects, further disrupt the traditional socio-economic fabric, leading to conflicts and displacement. These challenges transform the character of rural landscapes and threaten the viability of traditional rural life.

Based on the above source, attempt the following five questions.

276. Which type of rural settlement is characterized by isolated farmsteads spread over a large area?
(A) Dispersed settlements
(B) Compact settlements
(C) Linear settlements
(D) Nucleated settlements

277. A settlement that develops in a line along a transportation route or a river is an example of which settlement pattern?
(A) A rectangular pattern
(B) A circular pattern
(C) A dispersed pattern
(D) A linear pattern

278. According to the text, what is a significant contemporary problem affecting rural settlements?
(A) An increase in population due to reverse migration
(B) The drainage of the young population due to rural-urban migration
(C) A complete halt in land use changes
(D) The absence of land acquisition and transactions

279. The passage suggests that the process of land acquisition for industrial projects in rural areas often leads to:

may also result in remittances. For the destination, migration can fuel economic growth and cultural diversity but may also strain public services and create social tensions. Understanding the interplay of these types, causes, and consequences is crucial for analyzing changing population patterns and for formulating effective regional and national policies.

Based on the above source, attempt the following five questions.

266. Which of the following would be considered a 'push' factor in the context of migration?
(A) The availability of better job opportunities in a city
(B) Widespread unemployment in a person's home region
(C) The presence of political freedom in a destination country
(D) The allure of better public amenities in a new location

267. The passage describes migration as having multifaceted consequences. What is identified as a potential negative consequence for the area of origin?
(A) An increase in cultural diversity
(B) The loss of skilled and educated individuals ('brain drain')
(C) A strain on public services
(D) An immediate boost to the local economy

268. According to the source, Ravenstein's 'Laws of Migration' include the observation that:
(A) The majority of migratory movements cover short distances
(B) Most migration is international and permanent
(C) Migration is primarily driven by pull factors
(D) The primary cause of migration is environmental degradation

269. Based on the text, what is a potential positive consequence of migration for the area of origin?
(A) Fueling economic growth through new labor
(B) An increase in the local workforce
(C) The inflow of financial remittances from migrants
(D) A reduction in social tensions

270. The classification of migration as 'internal' or 'international' is based on what criterion?
(A) The duration of the stay
(B) The motivation of the migrant
(C) The consequences for the destination area
(D) The spatial scale of the movement

Direction : Please read the following source carefully.

The analysis of population composition and characteristics provides a deeper understanding of a society beyond mere population size or density. Key indicators include the age and sex structure, rural-urban distribution, occupational structure, and educational levels. The age-sex structure, commonly visualized through a population pyramid, reveals a population's history of fertility and mortality and indicates its future growth potential. A pyramid with a broad base signifies a young, rapidly growing population, typical of many developing countries, whereas a more constricted base or a barrel shape suggests an aging population, common in developed countries. The rural-urban composition reflects the level of urbanization and economic development, with a higher proportion of urban population generally correlating with industrialization. Occupational structure, which categorizes the workforce into primary, secondary, and tertiary sectors, is another strong indicator of economic maturity; a shift from primary (agriculture) to tertiary (services) activities signifies economic transformation. Similarly, educational levels within a population are a crucial measure of human capital, directly influencing economic productivity, social mobility, and demographic behavior, such as fertility rates. These characteristics are not static; they are dynamically interrelated and constantly evolving, shaping the socio-economic landscape of a region.

Based on the above source, attempt the following five questions.

271. A population pyramid with a very broad base and narrow top typically signifies which of the following?
(A) An aging population with low fertility
(B) A stationary population with equal birth and death rates
(C) A young population with high fertility and potential for rapid growth

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arguing that population, when unchecked, increases at a geometric rate, while the means of subsistence (food supply) increases at a slower, arithmetic rate. This disparity inevitably leads to a 'Malthusian catastrophe' unless population growth is curbed by 'preventive checks' (e.g., moral restraint) or 'positive checks' (e.g., famine, disease). In contrast, Michael Thomas Sadler's theory suggested a natural regulatory mechanism, proposing that human fecundity decreases as population density increases; essentially, prosperity and density act as natural brakes on population growth. David Ricardo's theory, while rooted in classical economics, also addressed population. He argued that an increase in population leads to a greater labor supply, which in turn drives down wages to the subsistence level. According to Ricardo, any short-term rise in wages above the subsistence level would only encourage workers to have more children, increasing the population and eventually pushing wages back down, trapping the population in a cycle of subsistence living. These theories, despite their age, continue to influence demographic thought, highlighting the enduring concern over the balance between population, resources, and economic well-being.

Based on the above source, attempt the following five questions.

261. What is the core argument of the Malthusian theory of population?
(A) Population growth naturally slows as density increases
(B) Population growth leads to higher wages and economic prosperity
(C) Population has no significant relationship with the means of subsistence
(D) Population increases geometrically while food supply increases arithmetically

262. According to the text, how does Sadler's theory of population differ from Malthus's?
(A) Sadler believed that famine and disease were the only checks on population
(B) Sadler proposed that fecundity decreases as population density and prosperity increase
(C) Sadler argued that population increases arithmetically, not geometrically
(D) Sadler focused exclusively on the role of wages in determining population size

263. In Ricardian theory, what is the anticipated consequence of a rise in wages above the subsistence level?
(A) A decrease in the labor supply
(B) A permanent improvement in the standard of living for the working class
(C) An encouragement for workers to have more children, increasing population
(D) A shift from agricultural to industrial production

264. The concept of 'positive checks' in Malthusian theory refers to factors that:
(A) Increase the food supply arithmetically
(B) Promote moral restraint to limit family size
(C) Lead to a geometric increase in population
(D) Increase the death rate, such as famine and disease

265. Which theorist is associated with the idea that an increase in labor supply from population growth depresses wages to a subsistence level?
(A) David Ricardo
(B) Michael Thomas Sadler
(C) Thomas Malthus
(D) Gordon Childe

Direction : Please read the following source carefully.

Migration, the movement of people from one place to another with the intention of settling, is a fundamental demographic process with profound geographical consequences. It can be classified by various criteria, including spatial scale (internal or international) and duration (temporary or permanent). The causes of migration are complex and are often conceptualized as a combination of 'push' factors, which compel people to leave their place of origin (e.g., unemployment, conflict, environmental degradation), and 'pull' factors, which attract them to a destination (e.g., job opportunities, political freedom, better amenities). Various models have been developed to explain these movements, such as Ravenstein's 'Laws of Migration' which, despite being formulated in the 19th century, offer timeless insights like the observation that most migration occurs over short distances. The consequences of migration are multifaceted, affecting both the origin and destination areas. For the origin, it can lead to a 'brain drain' and a demographic imbalance but

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(A) Strengthening of the traditional socio-economic fabric
(B) A decrease in rural-urban migration
(C) Conflicts and displacement of the local population
(D) Promotion of community cohesion

280. Compact or nucleated settlements are described as having which primary characteristic?
(A) Houses that are widely scattered and isolated
(B) A geometric arrangement along a single road
(C) A complete lack of community cohesion
(D) Houses clustered closely together in a central location

Direction : Please read the following source carefully.

The study of urban origins has been enriched by several influential theories that attempt to explain the impetus behind the formation of the first towns. Gordon Childe, in his theory of the 'Urban Revolution', emphasized an economic foundation, arguing that the development of metallurgy and the invention of the plow led to an agricultural surplus. This surplus freed a segment of the population from food production, allowing for the emergence of specialized craftsmen, priests, and administrators, who congregated in nascent urban centers. For Childe, the town was a product of a technological and economic revolution. Henri Pirenne, focusing on medieval European towns, offered a different perspective. He argued that the revival of long-distance trade was the primary catalyst. Towns re-emerged and grew as fortified marketplaces and centers for merchants, breaking the self-sufficient, feudal agrarian economy. His 'Pirenne Thesis' links urbanization directly to the resurgence of commerce. Lewis Mumford provided a more holistic, socio-cultural theory. He saw the city not merely as a physical or economic entity but as a cultural container. For Mumford, the earliest urban forms were ceremonial centers that brought people together for religious and social purposes, and the city's primary role was the transmission and enhancement of culture. These diverse theories highlight that urban origins were likely a complex phenomenon driven by a mix of economic, commercial, and socio-cultural forces.

Based on the above source, attempt the following five questions.

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281. Which theorist linked the origin of towns to the creation of an agricultural surplus resulting from technological advancements?
(A) Gordon Childe
(B) Lewis Mumford
(C) Henri Pirenne
(D) Walter Christaller

282. Henri Pirenne's theory on the origin of towns primarily emphasizes the role of:
(A) Agricultural surplus
(B) The revival of long-distance trade
(C) Religious and ceremonial activities
(D) Political and military consolidation

283. According to Lewis Mumford, the primary role of the earliest urban forms was:
(A) To function as fortified marketplaces for merchants
(B) To act as a cultural container for religious and social congregation
(C) To house specialized craftsmen freed from agriculture
(D) To manage the distribution of agricultural surplus

284. The "Pirenne Thesis" is most closely associated with the development of towns in which historical context?
(A) Medieval Europe
(B) Prehistoric river valleys
(C) Ancient Greece and Rome
(D) The Industrial Revolution in Britain

285. A key difference between Gordon Childe's theory and Lewis Mumford's theory is that:
(A) Childe emphasized trade while Mumford emphasized agriculture
(B) Childe studied medieval Europe while Mumford studied ancient civilizations
(C) Childe focused on economic factors while Mumford highlighted socio-cultural aspects
(D) Childe saw towns as a negative development while Mumford saw them as positive

Direction : Please read the following source carefully.

Urbanization, the process of population shift from rural to urban areas, manifests with distinct characteristics in developed and developing

(C) The Central Place Theory by Christaller
(D) The Sector Model by Hoyt

297. The idea that a city develops around several distinct centers rather than a single CBD is the core concept of which model?
(A) Harris and Ullman's Multiple Nuclei Model
(B) Burgess's Concentric Zone Model
(C) Hoyt's Sector Model
(D) Mumford's theory of urban origins

298. According to the passage, which of the following is described as a "changing urban form" associated with modern city growth?
(A) The Central Business District (CBD)
(B) Edge cities and peri-urban areas
(C) The zone of transition
(D) The zone of working-class homes

299. Urban Social Area Analysis is mentioned as a method for studying what phenomenon within a city?
(A) The growth of the informal sector
(B) The patterns of social segregation
(C) The development of transportation routes
(D) The efficiency of the Central Business District

300. The Concentric Zone Model envisions a city's structure as a series of:
(A) Nested rings radiating from a central core
(B) Multiple specialized centers of activity
(C) Wedge-shaped corridors extending from the center
(D) A dispersed network of satellite towns

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the spatial distribution, size, and number of settlements as a function of providing goods and services. He proposed a rigid hierarchy based on the principles of market, transport, and administration. Lösch later modified this, creating a less rigid and more complex model that allowed for specialized production centers, creating a more variable and realistic economic landscape of urban systems.

Based on the above source, attempt the following five questions.

291. A country where the largest city has a population of 10 million and the second-largest city has a population of 3 million would be an example of:
(A) A system conforming to the rank-size rule
(B) A system explained by Lösch's model
(C) A system demonstrating the law of the primate city
(D) A system with a perfectly regular urban hierarchy

292. What is the central idea behind Christaller's Central Place Theory?
(A) The spatial distribution of settlements is based on providing goods and services
(B) The largest city will be more than twice the size of the next largest
(C) The urban system is a result of specialized production centers
(D) The population of a city is determined by its rank

293. How did August Lösch's model of central places differ from Christaller's?
(A) Lösch introduced the concept of a primate city
(B) Lösch's model was applicable only to administrative functions
(C) Lösch's theory completely rejected the idea of a central place hierarchy
(D) Lösch created a less rigid and more complex model allowing for specialization

294. The rank-size rule suggests that in a well-integrated urban system, the fourth-largest city would have a population approximately:
(A) Half that of the largest city
(B) One-fourth that of the largest city
(C) Equal to that of the largest city
(D) Twice that of the second-largest city

295. The geometric shape used by Christaller to model the market areas of central places was the:
(A) Circle
(B) Square
(C) Hexagon
(D) Triangle

Direction : Please read the following source carefully.

Understanding the internal structure of the city has been a central theme in urban geography, with several classic models offering explanations for urban land use patterns. The Concentric Zone Model, proposed by Ernest Burgess, depicts the city as a series of five nested rings, with the Central Business District (CBD) at the core, followed by zones of transition, working-class homes, better residences, and a commuter zone. Homer Hoyt's Sector Model modified this by suggesting that cities grow outward in wedge-shaped sectors, often along transportation routes, with high-rent residential areas influencing the direction of growth. The Multiple Nuclei Model by Harris and Ullman argued that large cities develop not around a single center but around several distinct nuclei, which may be specialized centers for retail, industry, or education. These classical models provide a basis for understanding more recent urban phenomena. The growth of megacities and global cities has been accompanied by changing urban forms such as peri-urban areas, the rural-urban fringe, and the emergence of edge cities—suburban concentrations of business, shopping, and entertainment. Within this complex urban fabric, social segregation is a persistent issue, often studied through Urban Social Area Analysis. This segregation frequently manifests as poverty, characterized by slums, the growth of the informal sector, crime, and social exclusion, reflecting the deep socio-economic inequalities inherent in the urban structure.

Based on the above source, attempt the following five questions.

296. Which model of urban land use describes a city growing in wedge-shaped patterns along transportation lines?
(A) The Concentric Zone Model by Burgess
(B) The Multiple Nuclei Model by Harris and Ullman

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countries. In developed nations, urbanization was a gradual process, closely linked to industrialization over a long period. This allowed for the concurrent development of infrastructure, governance, and economic capacity to manage urban growth. The factors of urban growth were primarily economic pull factors, attracting labor to industrial centers. In contrast, urbanization in developing countries is a more recent and far more rapid phenomenon. It is often characterized by 'urbanization without industrialization', where population growth outpaces the creation of formal employment opportunities. This rapid growth is driven by a combination of rural push factors (e.g., poverty, landlessness) and the perceived, if not always real, opportunities in cities. Consequently, trends of urbanization in the developing world are marked by the proliferation of megacities, overburdened infrastructure, and significant challenges in providing basic services. While the size, structure, and functions of urban areas differ, the core distinction lies in the speed and scale of the process and the capacity of national and local governments to manage this transformative shift.

Based on the above source, attempt the following five questions.

286. What is a key characteristic of the urbanization process in developed countries as described in the passage?
(A) It was a rapid and recent phenomenon
(B) It occurred largely without corresponding industrialization
(C) It was primarily driven by rural push factors
(D) It was a gradual process linked to industrialization

287. The passage describes urbanization in developing countries as often being:
(A) Slow and manageable
(B) Accompanied by adequate infrastructure development
(C) Characterized by population growth that outpaces formal job creation
(D) Driven mainly by industrial pull factors

288. According to the text, what is a common trend associated with rapid urbanization in the developing world?
(A) The even distribution of the urban population across small towns
(B) The proliferation of megacities and overburdened infrastructure
(C) The decline in the number of large cities
(D) A strengthening of the rural economy

289. The source contrasts urbanization in developed and developing nations by highlighting that in the latter, the process is often driven by:
(A) A surplus of formal employment opportunities
(B) Well-planned urban expansion projects
(C) The slow and steady growth of the industrial sector
(D) A combination of rural push factors and perceived urban opportunities

290. A fundamental difference in the urbanization process between developed and developing countries mentioned in the text is the:
(A) Speed of population shift and the capacity to manage it
(B) Ultimate size of the urban population
(C) Complete absence of pull factors in developing countries
(D) Type of functions that urban areas perform

Direction : Please read the following source carefully.

The study of urban systems involves analyzing the relationships between cities and the arrangement of urban centers within a region. Two foundational concepts for understanding urban hierarchies are the rank-size rule and the law of the primate city. The rank-size rule posits that for a given country, the population of any city is approximately equal to the population of the largest city divided by its rank. This suggests a well-integrated urban system with a regular hierarchy of settlements. In contrast, the law of the primate city describes a situation where the largest city is disproportionately larger and more significant than any other city in the country, often being more than twice the size of the second-largest city. This indicates a less balanced urban system, often found in countries with a history of colonial dominance or centralized political power. Complementing these macro-level concepts are the Central Place Theories developed by Walter Christaller and August Lösch. Christaller's theory uses a model of nested hexagons to explain

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ANSWERS

1. (B) Census
A census is a systematic process of acquiring and recording information about the members of a given population. It is designed to be a complete enumeration, meaning every individual within the defined territory is counted at a specific point in time. This provides a comprehensive snapshot of demographic, economic, and social characteristics. Governments rely on this data for planning, resource allocation, and establishing an accurate statistical baseline for research.

2. (A) Thomas Malthus
Thomas Malthus proposed a theory suggesting that human population increases at a geometric rate while food production grows at an arithmetic rate. This disparity inevitably leads to a point where the population exceeds the available resources, resulting in a crisis. Malthus identified preventive checks, like moral restraint, and positive checks, such as famine or disease, as mechanisms that would eventually reduce the population back to sustainable levels for human survival.

3. (C) It is a city that is significantly larger and more dominant than other cities in the country.
A primate city is a central urban area that is significantly larger than any other city in a country. This dominance is not only in terms of population size but also in economic, political, and cultural influence. Such cities often concentrate a nation's resources, infrastructure, and services, creating a distinct imbalance in the national urban hierarchy. This pattern is frequently observed in developing nations or many former colonial territories.

4. (C) Statement I is true, but Statement II is false.
The occupational structure illustrates how a nation's workforce is distributed across different sectors like agriculture, industry, and services. Statement I correctly defines this concept. However, Statement II is false because a high proportion of workers in the primary sector is characteristic of developing, not developed, economies. Developed countries typically have most workers in the tertiary or quaternary sectors, which provide services and handle information in advanced economic systems worldwide.

5. (A) P-4, Q-1, R-2, S-3
Various thinkers have shaped demographic studies through distinct theories. Malthus focused on population outgrowing food supplies. Michael Sadler theorized that fertility naturally declines as population density increases. David Ricardo introduced the concept of the iron law of wages, linking population growth to subsistence-level income. Finally, Warren Thompson is credited with formulating the Demographic Transition Model, which describes the stages of birth and death rate changes as societies undergo the process of modernization.

6. (B) Total Fertility Rate (TFR)
Mortality measures are statistical indicators used to track the frequency and patterns of death within a specific population. Common metrics include the crude death rate, infant mortality rate, and life expectancy at birth. In contrast, the total fertility rate is a measure of natality, representing the average number of children a woman is expected to have. It focuses on birth patterns and reproductive performance rather than the incidence of death or survival.

7. (D) A high birth rate and high death rate.
A population pyramid with a wide base and a narrow top indicates a young population structure. The wide base reflects a high birth rate, as many children are born each year. The rapidly tapering sides and narrow peak suggest a high death rate across different age groups, resulting in lower life expectancy. This triangular shape is characteristic of nations in the early stages of the demographic transition, typically found in developing countries.

8. (A) Both A and R are true and R is the correct explanation of A.
Many developed nations experience declining birth rates and an increasing proportion of elderly citizens. This demographic shift leads to

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the Early Expanding stage, where death rates fall while birth rates remain high. Next is the Late Expanding stage, as birth rates begin to decline. Finally, the Low Stationary stage is reached, where both rates are low, resulting in a stable or slowly growing population.

24. (A) Coverage error, such as the undercounting or overcounting of individuals.
Census data can be affected by various types of inaccuracies. A coverage error specifically refers to the failure to count all individuals in a population or counting some individuals multiple times. This often happens due to the omission of marginalized groups, like the homeless, or difficulties in reaching remote areas. Unlike sampling errors, which occur when studying a subset, coverage errors affect the total enumeration. These discrepancies can impact the reliability of demographic and planning statistics.

25. (C) A pro-natalist policy
A pro-natalist policy is a government strategy designed to increase the birth rate of a population. These policies are often implemented in countries facing declining fertility and aging populations. Common measures include financial incentives for families with children, tax credits, subsidized childcare, and extended parental leave. By reducing the economic burden of raising children, the state aims to encourage larger family sizes and ensure a sustainable workforce for future economic growth and social stability.

26. (A) The path of major transportation routes.
Homer Hoyt's Sector Model proposes that cities grow in a series of pie-shaped wedges rather than concentric rings. He argued that high-rent residential areas and industrial zones expand outward from the city center along major transportation corridors, such as rail lines or highways. Once a specific land use is established in a sector, it tends to stay there as the city grows. This model emphasizes the critical role of transport in shaping the urban landscape.

27. (D) Social institutions and cultural containers.
Lewis Mumford viewed the city as more than just an economic or defensive entity; he emphasized its role as a cultural and social container. According to his theory, the origins of towns are rooted in the development of social institutions, religious practices, and the gathering of people for ritualistic purposes. He argued that these cultural functions preceded and facilitated the economic activities that are often credited with urban growth, making the city a vessel for human civilization.

28. (A) 1, 2 and 4
Fertility rates are influenced by a variety of social and economic factors. Higher education levels for women and increased use of contraceptives are consistently linked to lower fertility. Conversely, high infant mortality can lead to higher fertility as parents may have more children to ensure some survive. While urbanization often correlates with lower fertility due to the increased costs of living and changing social norms, Statement 3 incorrectly suggests it generally leads to an increase in birth rates.

29. (C) Identifying residential segregation based on socioeconomic status, family status, and ethnic status.
Social Area Analysis is a technique used in urban geography to study the spatial distribution of different social groups within a city. It focuses on three main dimensions: socioeconomic status, which looks at occupation and education; family status, reflecting age and household type; and ethnic status, which examines racial or national origins. By mapping these variables, researchers can identify patterns of residential segregation and understand how social diversity is organized across various urban neighborhoods and communities.

30. (B) The official and continuous registration of births, deaths, marriages, and divorces.
Vital statistics refer to the continuous and systematic recording of major life events by a government authority. This source of population data includes registrations of births, deaths, marriages, and divorces. Unlike a census, which provides a periodic snapshot of the entire population, vital statistics provide ongoing information about demographic changes. This data is essential for calculating rates of natural increase, understanding health trends, and planning public services such as education, healthcare, and social security programs.

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complex urban civilizations with centralized authority and institutions.

16. (A) Both A and R are true and R is the correct explanation of A.
The sex ratio is a fundamental demographic indicator reflecting the balance between males and females in a population. It serves as a key measure of social well-being and gender equity. Significant imbalances in this ratio can trigger profound social consequences, such as a shortage of potential marriage partners or increased social instability. Governments monitor these trends closely to address underlying issues like gender-based discrimination or sex-selective practices that distort the natural population structure.

17. (C) Statement I is true, but Statement II is false.
David Ricardo proposed the iron law of wages, suggesting that market wages naturally gravitate toward a subsistence level required for worker survival. Statement I accurately reflects this theory. However, Statement II is false because Ricardo believed that if wages rose above subsistence, the resulting prosperity would lead to population growth as workers had more children. This increase in labor supply would then create competition, eventually driving wages back down to the minimum subsistence level.

18. (A) The minimum number of people required to support a good or service.
In Central Place Theory, the threshold refers to the smallest market size necessary for a business or service to remain profitable and viable. Different goods and services have varying thresholds; for instance, a grocery store requires fewer customers than a specialized hospital. If the population in a service area falls below this threshold, the good or service cannot be sustained. This concept helps explain the spatial distribution and hierarchy of urban settlements.

19. (B) P-4, Q-2, R-3, S-1
Demographic indices provide specific measures of population dynamics. The Crude Birth Rate represents live births per thousand people annually. The Infant Mortality Rate calculates deaths of infants under one year per thousand live births. The Age-Dependency Ratio compares the non-working population to those of working age. Finally, the Total Fertility Rate estimates the average number of children a woman will have in her lifetime based on current age-specific fertility patterns and reproductive trends.

20. (D) It is primarily residential with very little commercial activity.
An edge city is a substantial urban concentration located on the outskirts of a larger metropolis, typically at major highway intersections. These areas are characterized by significant office and retail space, often providing more jobs than bedrooms. Unlike traditional suburbs, which are primarily residential, edge cities function as independent economic hubs. They have often transformed from rural or residential landscapes into dense commercial centers within just a few decades, serving a massive daily population.

21. (D) 1, 2, 3, 4 and 5
The distribution of human population is influenced by a complex interplay of physical and human factors. Favorable climates, flat terrain, and the availability of fresh water are primary physical determinants. Fertile soil and mineral resources also attract settlement by supporting agriculture and industry. Furthermore, government policies, such as the creation of new capitals or regional development incentives, can actively reshape where people live. All these elements together define the uneven density observed across the globe.

22. (B) The settlement has developed along a road, river, or coastline.
A linear settlement pattern occurs when buildings are constructed in a long line, following the path of a specific physical or man-made feature. This usually happens along transportation routes like roads and railways or natural features such as riverbanks and coastlines. Such a configuration allows residents easy access to the transport corridor or water source. It is a common settlement type in both rural areas and along narrow valleys where flat land is limited.

23. (A) 2, 4, 1, 3
The Demographic Transition Model describes the historical transformation of population patterns through four distinct stages. It begins with the High Stationary stage, characterized by high birth and death rates. This is followed by

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education, urbanization, and increased access to contraception. Meanwhile, death rates continue to fall or stabilize at a low level. Consequently, the rate of natural increase slows down, and the population grows at a much more moderate pace compared to the explosive growth seen earlier.

39. (C) Activities that are untaxed, unregulated, and often small-scale.
The informal sector consists of economic activities that operate outside the official regulatory and taxation framework of the state. This sector is characterized by small-scale, labor-intensive enterprises, such as street vending, casual labor, and home-based workshops. It provides crucial employment for many urban residents, especially in developing countries where the formal economy cannot absorb the growing workforce. Workers in this sector often lack job security, benefits, and legal protections, reflecting the challenges of rapid, unplanned urbanization.

40. (A) Long-distance trade
Henri Pirenne argued that the revival of long-distance trade was the fundamental catalyst for the re-emergence of towns in medieval Europe. He believed that the disruption of Mediterranean trade routes by Islamic expansion led to the decline of ancient urban centers. Later, the resurgence of trade activities and the rise of a new merchant class created the need for fortified trading posts, which eventually evolved into autonomous medieval towns centered on commerce rather than just agriculture or administration.

41. (D) Physiological density
Physiological density is a measure of the total population divided by the amount of arable land, which is land suitable for agriculture. This metric provides a more accurate reflection of the pressure on a country's food-producing resources than simple arithmetic density. A high physiological density indicates that a large number of people must be supported by a limited amount of fertile land. It is a critical indicator for understanding food security and the carrying capacity of a specific region.

42. (B) A planned town, physically separate from a major city but functionally linked to it.
A satellite town is a planned urban settlement that is physically separated from a larger central city, often by a greenbelt or rural land. While it has its own residential areas and economic base, it remains functionally linked to the metropolis through transportation and employment networks. Satellite towns are designed to provide an alternative to urban sprawl, offering local jobs and services while allowing residents to access the specialized amenities of the nearby major city when needed.

43. (C) Urbanization in developing countries is often accompanied by a lower level of industrialization compared to the historical experience of developed nations.
In developed nations, urbanization was closely tied to the Industrial Revolution, where factory jobs pulled rural workers into cities. In contrast, many developing countries are experiencing rapid urban growth without a corresponding increase in industrial employment. This process is often driven by rural push factors and a growing informal sector rather than robust industrialization. Consequently, these cities face unique challenges, such as large populations in informal settlements and high levels of urban poverty, which differ from historical Western experiences.

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44. (D) A change in the age and sex structure of the rural population, often leaving behind the elderly.
Rural-urban migration has significant demographic impacts on the source areas. Since young adults are the most likely to migrate in search of better opportunities, the rural population often experiences a drain of its most productive labor force. This leads to a higher dependency ratio, as a larger proportion of children and the elderly are left behind. Furthermore, if the migration is gender-biased, it can result in a distorted sex ratio, affecting the social and economic vitality of villages.

45. (D) 1, 2, 3 and 4
Population data reliability can be compromised by various types of errors and biases. Age misreporting occurs when respondents provide estimated or rounded figures. Deliberate falsification of information like income often stems from privacy concerns or social expectations. Additionally, some groups, such

31. (C) Moral restraint, late marriage, and celibacy.
Thomas Malthus categorized the factors that control population growth into two types. Preventive checks are voluntary actions taken by individuals to reduce birth rates. These include moral restraint, postponing marriage, and practicing celibacy. Malthus believed that if people exercised these choices, they could prevent the population from outgrowing the food supply. These differ from positive checks, which increase the death rate through natural disasters or social strife when the population exceeds its limits of subsistence.

32. (B) Widespread gentrification caused by urban professionals moving into rural communities.
Rural settlements in developing countries face numerous challenges, including massive out-migration to urban centers and conflicts over land use as agricultural fields are converted for infrastructure or industrial projects. However, widespread gentrification is not a typical contemporary problem in these regions. Gentrification, where affluent professionals move into lower-income areas, is more commonly observed in the urban neighborhoods or rural fringes of developed countries rather than in the traditional rural settlements of the developing world.

33. (A) Both A and R are true and R is the correct explanation of A.
In Malthusian theory, positive checks are external factors that reduce population size by increasing the death rate. These checks occur naturally when a population exceeds its means of subsistence. Examples include famines, disease outbreaks, epidemics, and wars. Malthus argued that if human society did not control its growth through preventive measures, these positive checks would inevitably act as a harsh mechanism to restore the balance between the number of people and the available food supply.

34. (D) Rank and population size of cities in a country.
The rank-size rule describes a specific statistical relationship within a country's urban hierarchy. Formulated by G.K. Zipf, it suggests that the population of a given city is inversely proportional to its rank. For instance, the second-largest city should have half the population of the largest city, and the third-largest city should have one-third. This pattern indicates a well-integrated urban system where population and services are distributed across many cities of varying sizes rather than one.

35. (A) Suburbanization
Suburbanization is the process by which populations shift from the central areas of a city to residential communities on its outskirts. These outlying areas, known as suburbs, remain economically and socially linked to the central city, often serving as commuter zones. This movement is typically driven by factors such as the desire for more living space, lower housing costs, and improved transportation networks. It leads to the horizontal expansion of urban areas, changing land use on the urban fringe.

36. (C) Statement I is true, but Statement II is false.
Lee's Model of Migration identifies different factors that influence the decision to move. Push factors are negative conditions at the place of origin, such as unemployment or conflict, that encourage people to leave. Pull factors are positive attributes at the destination, like better wages or safety, that attract migrants. Statement I correctly describes this categorization. However, Statement II is false because it incorrectly defines pull factors as negative conditions when they are actually the positive attractions of the destination.

37. (D) Provides a complex arrangement of market areas with sectors of high and low density.
August Lösch modified Christaller's Central Place Theory to create a more flexible and economically realistic model. While Christaller assumed a rigid hierarchy with fixed values, Lösch allowed for different market areas to overlap and vary in size. His model resulted in a complex pattern of city-rich and city-poor sectors radiating from a central point. This approach emphasizes profit maximization for individual firms and accounts for the diverse spatial requirements of different businesses, leading to a more varied landscape.

38. (A) 1, 2 and 3
Stage 3 of the Demographic Transition Model, known as the Late Expanding stage, is characterized by a significant decline in birth rates. This change occurs due to social and economic factors such as improved female

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a shrinking workforce and higher social security costs. To counter these trends, governments often implement pro-natalist policies, such as financial incentives or parental leave, to encourage higher fertility. These measures aim to stabilize the age structure and ensure a sustainable supply of labor to support the national economy over the long term.

9. (C) A hexagon
Walter Christaller utilized hexagonal shapes to model the ideal market areas for central places. Circles were considered impractical because they either overlap or leave unserved gaps between service areas. Squares would result in unequal distances from the center to the corners and edges. The hexagon provides a balanced geometric solution, ensuring that all areas are efficiently covered and serviced without overlaps, maintaining a uniform distance for consumer travel to the center.

10. (A) The Multiple Nuclei Model argues that a city develops around a single central business district.
The Multiple Nuclei Model suggests that urban growth does not originate from a single central point but rather from several specialized nodes or nuclei. These centers might include ports, industrial districts, or university campuses that attract related land uses. This perspective differs from earlier models, such as the concentric zone or sector models, which emphasized a single central business district as the primary anchor for all economic development and urban expansion.

11. (D) 1, 2, 3 and 4
Population data comes from diverse sources, each with specific objectives. A census provides a comprehensive count of every individual within a territory. Sample surveys gather detailed information from a representative subset to make broader inferences. Vital statistics systems ensure continuous registration of demographic events like births and deaths. However, all these data sources can face reliability issues, such as undercounting in remote areas or errors in reporting, which statistical agencies must carefully monitor.

12. (B) The transitional zone on the outskirts of a city where urban and rural land uses are mixed.
The rural-urban fringe is a dynamic area located at the boundary between a city and the surrounding countryside. It is characterized by a mix of land uses, including residential developments, agricultural fields, and industrial sites. This zone often experiences rapid transformation and land-use conflicts as the urban area expands. It lacks a clear urban or rural identity, representing a landscape in transition where diverse activities and environmental features often overlap significantly.

13. (C) A significant decline in global mortality rates due to medical and sanitary improvements.
During the twentieth century, the world experienced unprecedented population growth primarily due to a sharp drop in death rates. Advances in medical science, such as vaccines and antibiotics, combined with improved sanitation and food security, significantly increased life expectancy. While birth rates remained high in many regions, the survival of more infants and adults created a massive natural increase. This demographic shift led to the rapid expansion of the global human population.

14. (D) Harris and Ullman : Multiple Nuclei Model
Urban geography includes various models to explain city structures. Burgess proposed the Concentric Zone Model, focusing on rings. Homer Hoyt developed the Sector Model, emphasizing transportation wedges. Walter Christaller is known for Central Place Theory. The Multiple Nuclei Model was co-authored by Chauncy Harris and Edward Ullman, suggesting that cities develop around several distinct centers rather than one. Identifying these pairings is essential for understanding the evolution of theoretical perspectives on urban development.

15. (A) Gordon Childe
Gordon Childe was a prominent archaeologist who linked the emergence of the first cities to the agricultural surplus generated during the Neolithic Revolution. He argued that the ability to produce extra food allowed for social stratification and the development of non-agricultural specialists, such as artisans and administrators. This process, which he termed the Urban Revolution, transformed human society from small, self-sufficient villages into

as nomadic populations or the homeless, may be omitted entirely during the enumeration process. Technical errors during data transcription and processing also contribute to inaccuracies, highlighting the need for rigorous quality control measures in all census operations.

46. (C) A city with a population of 10 million or more inhabitants.
A megacity is defined by the United Nations as an urban area with a total population exceeding ten million people. These massive agglomerations are characterized by intense economic activity, complex social structures, and significant infrastructure challenges. While many megacities are also global cities that influence the world economy, the term primarily refers to the sheer size of the population. The number of megacities has increased rapidly, particularly in Asia and Africa, as a result of global urbanization trends.

47. (B) As the density of a population increases, its fertility tends to decrease.
Michael Sadler proposed the Destiny Theory, which challenged the Malthusian view of population growth. He argued that human fertility is not a constant but is influenced by the density of the population. According to Sadler, as a population becomes more dense and a society more advanced, the natural instinct to reproduce decreases. He believed that this self-regulating mechanism would eventually lead to a stable population size, preventing the catastrophic overpopulation and food shortages predicted by his contemporaries like Malthus.

48. (C) Urban poverty and social exclusion.
The proliferation of slums, the rise in crime rates, and the expansion of the informal economy are often visible symptoms of urban poverty. These phenomena occur when cities grow faster than the formal economy and infrastructure can accommodate. Social exclusion further compounds these issues by denying marginalized groups access to quality education, healthcare, and formal employment. This creates a cycle of disadvantage where residents of impoverished areas are spatially and socially isolated from the benefits of urban development and prosperity.

49. (C) Statement I is true, but Statement II is false.
The Multiple Nuclei Model, proposed by Harris and Ullman, suggests that modern cities develop around multiple specialized centers rather than a single central business district. Statement I correctly describes this concept. However, Statement II is false because the Multiple Nuclei Model is actually considered more applicable to complex, modern cities than the simpler Burgess model. Modern urban areas often feature diverse nodes like airports, industrial parks, and suburban shopping centers that drive growth, making a multi-centered model more realistic.

50. (A) P-3, Q-1, R-4, S-2
Migration is driven by various factors and follows specific patterns. Push factors, like unemployment, drive people away from their origin, while pull factors, like job opportunities, attract them to destinations. Intervening obstacles, such as financial constraints, can hinder or delay movement. Step migration describes a process where individuals reach their final destination through a series of shorter moves, typically progressing from rural villages to larger towns and then finally to major metropolitan cities in search of better prospects.

51. (C) Concentric zone
Rural settlement patterns describe the physical arrangement of houses and fields in the countryside. Common types include linear, where houses follow a road or river; rectangular, often found in planned farming areas; and dispersed, where farmsteads are scattered. In contrast, the concentric zone model is an urban land use theory that describes how cities are organized in rings around a central business district. It is not used to classify the structure of small, traditional rural settlements or agricultural communities.

52. (A) Role as a command and control center in the global economy.
A global city, or world city, is identified by its functional importance in the international economic system rather than just its population size. These cities serve as primary nodes for global finance, trade, and corporate headquarters. They are centers of innovation, high-level services, and international political influence. By managing and coordinating the global economy, global cities link their national economies to the world

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market, making them essential hubs in the new international division of labor and information.

53. (C) Decrease birth rates.
An anti-natalist policy is a government program designed to slow down population growth by discouraging large families and decreasing birth rates. These policies are typically implemented in countries where rapid population expansion outpaces resource availability and economic development. Common strategies include promoting family planning, providing access to contraception, and implementing legal limits on family size, such as China's former one-child policy. Such measures aim to achieve a sustainable population size and improve the overall standard of living for citizens.

54. (D) Low birth rate and low death rate.
Stage 4 of the Demographic Transition Model represents the final phase of population change in highly developed societies. In this stage, both birth and death rates are low and relatively stable. Consequently, the rate of natural increase is very low or zero, leading to a stable or even declining population size. This stage is characterized by high levels of education, urbanization, and quality healthcare, where the population structure often shows an increasing proportion of elderly people.

55. (A) 1, 2 and 4
Migration factors are categorized into push and pull elements. Push factors are negative conditions at the place of origin that compel people to leave, such as political instability, high unemployment, and natural disasters like famine or drought. On the other hand, pull factors are positive attributes at the destination, like better education or higher wages, that attract migrants. Identifying these differences is essential for understanding migration flows and the socio-economic motivations behind the movement of populations across different regions.

56. (B) Zone of transition.
In the Concentric Zone Model proposed by Ernest Burgess, the zone of transition is the second ring immediately surrounding the Central Business District. This area is characterized by a mix of land uses, including older residential buildings often in decline, small-scale industries, and immigrant settlements. It is a dynamic and often neglected part of the city where commercial activities are constantly encroaching on residential spaces. This zone typically houses low-income populations and recently arrived migrants due to its affordable housing.

57. (D) Emergence of a new merchant class.
Henri Pirenne's thesis on the origin of medieval towns emphasizes the crucial role of the merchant class and the resurgence of commerce. He argued that as long-distance trade revived, traders established permanent settlements at strategic locations, such as river crossings or fortified sites. These trading posts, or 'portus', attracted artisans and other workers, eventually evolving into autonomous towns. This process marked a shift away from the purely agrarian and feudal structure of the early Middle Ages toward an urban-commercial economy.

58. (A) General Fertility Rate
Fertility indices are used to measure the actual reproductive performance of a population. The General Fertility Rate is a common index that calculates the number of live births per thousand women of childbearing age, usually defined as 15 to 49 years. This provides a more refined measure than the crude birth rate. In contrast, death rates and mortality rates measure the incidence of death, while maternal mortality focuses specifically on deaths related to pregnancy and childbirth within a population.

59. (C) Lewis Mumford
Lewis Mumford was an influential urban theorist who described the city as a biological entity with a specific life cycle. He identified several stages of urban development, starting with the simple village and progressing toward the massive metropolis. Mumford used the term 'necropolis', or the city of the dead, to describe the final stage of urban decay. In this phase, the city becomes overwhelmed by social disintegration, war, and physical decline, eventually leading to its collapse as a living community.

60. (A) Both A and R are true and R is the correct explanation of A.
The Demographic Transition Model was originally developed based on the historical experiences of Western European nations during their industrialization. Critics argue that

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this model may not perfectly apply to modern developing countries because they face different socio-economic conditions. For instance, many developing nations have seen rapid declines in death rates due to imported medical technology, while birth rates remain high due to cultural factors. These unique contexts mean that the timing and pace of their demographic transitions often differ significantly.

61. (D) Process by which certain groups are denied access to resources, opportunities, and social participation.
Social exclusion in an urban context is a process where individuals or communities are systematically blocked from various rights and resources. This can include a lack of access to quality housing, employment, healthcare, and education. It is often driven by factors such as poverty, race, or ethnicity. Excluded groups are frequently concentrated in disadvantaged neighborhoods with poor infrastructure. This process prevents full participation in the social, economic, and political life of the city, leading to increased inequality and social tension.

62. (A) Individual farmhouses are scattered across the landscape, separated by farmland.
A dispersed rural settlement is characterized by individual houses or farmsteads that are spread out over a large area, rather than being clustered together. Each dwelling is typically surrounded by its own agricultural land, reflecting an extensive farming system. This pattern is common in regions with rugged terrain, where land is plentiful but not uniformly fertile, or where safety and defense are not primary concerns. It allows farmers to live directly on the land they cultivate, minimizing travel time to their fields.

63. (C) Has a small area and population, and was previously a colonial territory.
The law of the primate city is frequently observed in countries that have experienced colonial rule. During the colonial period, investment and infrastructure were often concentrated in a single administrative or port city to facilitate trade with the colonizing nation. This created an imbalanced urban hierarchy where one city became disproportionately large and dominant. Small countries with centralized economies also tend to exhibit this pattern, as resources and political power are less likely to be distributed among multiple large urban centers.

64. (C) Statement I is true, but Statement II is false.
Urbanization in developing countries is marked by the rapid expansion of major metropolitan areas and megacities. Statement I correctly identifies this significant trend. However, Statement II is false because this growth is primarily driven by rural-to-urban migration and high rates of natural increase within the cities themselves. Rural-to-rural migration, while common in some agricultural regions, does not contribute to the expansion of large cities. Instead, people move to urban centers in search of better jobs, services, and economic opportunities.

65. (D) 1, 2, 3 and 4
Population composition involves several key demographic and social characteristics. The sex ratio measures the balance between males and females, while the age structure, visualized through pyramids, shows the distribution across different age groups. Educational level indicates the population's schooling and literacy attainment. Furthermore, rural-urban composition reflects the proportion of people living in various settlement types. Together, these variables provide a comprehensive understanding of a society's human resources and help governments plan for future needs in healthcare, education, and employment.

66. (B) The conversion of agricultural land for non-agricultural uses like industry or housing.
Land acquisition and transaction policies are critical in managing the expansion of urban and industrial activities into rural areas. This process often involves the conversion of fertile agricultural land into sites for housing, factories, or infrastructure projects. This shift can lead to the displacement of rural communities and the loss of traditional livelihoods. Policies are needed to ensure fair compensation for landowners, minimize the loss of productive farmland, and manage the social and environmental impacts of such significant land-use changes.

67. (B) Lee's Model of Migration
Lee's Model of Migration expands on earlier theories by emphasizing that the decision to migrate is not just about push and pull factors. He

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Gordon Childe's "Urban Revolution" theory identifies the creation of an agricultural food surplus as the essential prerequisite for the birth of cities. He argued that once farmers could produce more food than they needed for their own families, this surplus could support a specialized population that did not farm. These specialists, including craftsmen, priests, and administrators, lived in centralized settlements, leading to the development of complex urban societies with organized governance, writing, and social classes, marking a major turning point in human history.

82. (A) An anti-natalist policy.
China's "one-child policy" is a prominent example of an anti-natalist policy implemented to slow down rapid population growth. Introduced in the late 1970s, it strictly limited most families to a single child through a combination of incentives and penalties. The goal was to reduce the strain on national resources and facilitate economic development. Such policies are designed to lower fertility rates and achieve a more sustainable population size, though they can also lead to long-term demographic challenges like an aging population.

83. (B) Pie-shaped wedges radiating from the center.
The Sector Model of urban structure, proposed by Homer Hoyt, suggests that land use is organized into pie-shaped wedges that radiate outward from the central business district. Hoyt argued that different types of residential and industrial activities expand along transportation corridors like rail lines or highways. Once a specific land use, such as a high-income neighborhood, is established in a sector, it tends to stay in that sector as the city grows, creating a pattern of wedges rather than concentric rings.

84. (D) Collects data from a representative subset of the population.
The fundamental difference between a census and a sample survey lies in the scope of data collection. A census aims to enumerate every single individual in a population at a specific time, which is costly and infrequent. In contrast, a sample survey collects information from a carefully selected representative subset of the population. This allows researchers to make accurate inferences about the whole population more quickly and at a lower cost. Sample surveys are often used to gather detailed data on specific social or economic topics.

85. (A) P-2, Q-1, R-4, S-3
Population policies vary according to a country's demographic goals. Developed nations with aging populations often use pro-natalist incentives, like financial bonuses, to encourage larger families. In contrast, developing countries with rapid growth may implement restrictive anti-natalist measures like child limits. Improving access to family planning is a common strategy for fertility control globally. Some developed countries also encourage the migration of skilled workers to address native labor shortages. These diverse policies aim to balance population size and structure with economic and social needs.

86. (B) Is part of a chain of towns encircling a major metropolitan area.
A ring town is a settlement that belongs to a series of towns located in a circular or ring-like pattern around a major metropolitan city. These towns are often developed to manage urban expansion and provide residential and economic alternatives to the overcrowded central city. Ring towns are typically connected to each other and to the main metropolis by major ring roads or transportation loops. This arrangement helps in distributing the population and reducing the pressure on the infrastructure of the central urban core.

87. (D) Widespread gentrification
Poverty in the city manifests in several ways, including the growth of substandard housing in slums and the expansion of the informal economy as people seek unregulated work. Increased crime rates are also often linked to urban poverty and social exclusion. Gentrification, however, is not a manifestation of poverty; rather, it is a process where higher-income groups move into and renovate lower-income neighborhoods, often leading to the displacement of poor residents. It represents a different urban dynamic driven by reinvestment and social change.

88. (D) 1, 2, 3 and 4
Mortality indices are statistical tools used to measure the frequency of death within a population or specific subgroups. The Infant

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According to his theory, while human populations tend to grow at a geometric rate, the food supply can only increase at an arithmetic rate. This inevitable imbalance means that population will eventually be checked by the scarcity of resources. Malthus believed that if moral restraint did not limit growth, natural checks like famine and starvation would intervene to bring the population back in line with the available food supply.

75. (B) 1, 2, 3, 4 and 5
Migration takes many forms depending on the distance, motivation, and nature of the movement. International migration involves crossing borders, while internal migration occurs within a country. Voluntary migration is driven by personal choice, like seeking better jobs, whereas forced migration results from external pressures like conflict. Cyclical migration, such as seasonal pastoralism, involves regular movement between locations. All these types contribute to the complex spatial distribution of populations and reflect the diverse reasons why people move within and across national boundaries.

76. (D) A city's land use pattern develops around several distinct centers or nuclei.
The Multiple Nuclei Model, developed by Harris and Ullman, suggests that cities do not grow from a single central point. Instead, they develop around several independent nodes or nuclei, such as a port, a university, or an industrial district. Each nucleus attracts specific types of land use that benefit from being near each other. This model recognizes that modern urban areas are complex and that factors like specialized location requirements and the repulsion of incompatible activities shape the overall city structure and growth.

77. (A) An aging population and declining birth rates.
An increasing dependency ratio occurs when the non-working population grows faster than the working-age population. In many developed countries, this is caused by a combination of low birth rates and increased life expectancy. As birth rates fall, fewer young people enter the workforce. Simultaneously, improvements in healthcare lead to an aging population with more people reaching retirement. This shift places a greater economic burden on the working-age group to support social services, healthcare, and pensions for the elderly and the young.

78. (D) Longitude
The distribution of the world's population is primarily determined by physical and political factors. Climate, topography, and the availability of water are fundamental physical determinants that influence where people can live and grow food. Political boundaries also shape population patterns through migration laws and government settlement policies. In contrast, longitude is merely a geographical coordinate and does not directly influence the suitability of an area for human habitation or the economic and social factors that drive population concentration in specific regions.

79. (C) Statement I is false, but Statement II is true.
The rank-size rule and the primate city rule describe different urban hierarchies. Statement I is false because the rank-size rule characterizes a balanced urban system, whereas countries with a dominant primate city show a sharp imbalance. Statement II is true, as the primate city rule describes a situation where the largest city is disproportionately bigger than any other city in the country. A primate city often dominates the nation's political and economic life, a pattern very different from the integrated rank-size distribution.

80. (C) High levels of poverty, inequality, and lack of opportunity.
Crime and social exclusion in urban areas are deeply rooted in socioeconomic disparities. High levels of poverty and inequality create environments where individuals and communities are denied access to essential services, quality education, and formal employment. This marginalization can lead to social frustration and an increase in criminal activity as a survival strategy or a response to exclusion. Addressing these issues requires comprehensive policies that promote economic opportunity, social integration, and the equitable provision of resources across all urban neighborhoods.

81. (B) The creation of a food surplus through agriculture.

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In migration studies, pull factors are the positive attributes of a destination that attract people to move there. The prospect of better employment opportunities and higher wages is one of the most significant pull factors, driving people from areas with limited economic prospects toward cities or regions with thriving economies. These attractions motivate voluntary migration as individuals seek to improve their quality of life. Pull factors contrast with push factors, which are the negative conditions at home that force or encourage people to leave.

96. (B) Sector Model (Hoyt)
The Sector Model, proposed by Homer Hoyt in 1939, was the first urban land use model to explicitly highlight the importance of transportation routes in shaping the city's growth. Hoyt argued that high-rent residential areas and industrial zones expand outward from the city center in wedges along major transportation lines like rail corridors and highways. This perspective challenged the earlier concentric zone model by suggesting that the city's structure is influenced by the accessibility and efficiency of transport rather than just simple outward expansion in all directions.

97. (B) An error of coverage (undercount)
An error of coverage in a census occurs when individuals or groups are not counted at all, leading to an undercount of the population. This type of error is common among marginalized or mobile populations, such as the homeless, migrants, and people living in remote or inaccessible areas. Coverage errors can also involve overcounting if people are enumerated in more than one location. Ensuring accurate coverage is one of the greatest challenges in census operations and is essential for reliable demographic analysis and fair resource allocation.

98. (C) Statement I is true, but Statement II is false.
Most developed countries have moved into the later stages of the demographic transition, characterized by low birth and death rates. Statement I is therefore true. However, Statement II is false because very few countries remain in Stage 1, which involves high and fluctuating birth and death rates with little population growth. Most developing countries are in Stage 2 or Stage 3, where they are experiencing rapid or slowing population growth due to declining death rates and varying birth rates as they continue to modernize and develop.

99. (C) Urban social area analysis.
Urban Social Area Analysis is a field of study focused on identifying and mapping the spatial distribution of different social groups within cities. It uses variables such as socioeconomic status, family structure, and ethnic background to analyze how populations are sorted into various residential neighborhoods. By identifying patterns of concentration and segregation, this analysis helps researchers understand the social geography of the city and the processes that lead to the clustering of people with similar characteristics, lifestyles, or identities in specific urban areas.

100. (D) 3, 4 and 5
An aging population structure in developed countries brings significant social and economic shifts. As life expectancy increases and birth rates decline, the proportion of elderly people grows. This trend places greater pressure on healthcare and pension systems. However, an aging population also creates a growing market for products and services tailored to the elderly, sometimes called the "silver economy." While it can lead to a shortage of labor, it does not necessarily result in rapid overall population growth; in fact, many such countries face population stagnation or decline.

101. (B) Demographic transition
The demographic transition is a model that describes the historical shift in population patterns from high birth and death rates to low birth and death rates. This process typically occurs as a country undergoes industrialization and economic development. The transition is usually divided into four or five stages, starting with a period of high stability, followed by rapid growth as death rates fall, and finally reaching a new period of stability with low birth and death rates. It is a fundamental concept in demographic and geographic studies.

102. (A) Henri Pirenne
Henri Pirenne was a Belgian historian who proposed that the origin of medieval towns was fundamentally linked to the revival of commerce

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Mortality Rate tracks deaths of children under one year, while the Child Mortality Rate covers those under five. The Maternal Mortality Ratio measures deaths related to pregnancy and childbirth. The Crude Death Rate provides an overall measure of deaths per thousand people annually. All these metrics are essential for evaluating public health, understanding life expectancy, and identifying the effectiveness of healthcare systems in a country.

89. (C) A primate city
A primate city is an urban center that is disproportionately larger and more influential than any other city in a country. This dominance is seen in its population size, economic output, and political power. Such cities often act as the primary hub for national culture and infrastructure, attracting a large share of the country's resources and migration. The law of the primate city is common in many developing nations, where the urban hierarchy is dominated by one massive city rather than multiple medium-sized urban centers.

90. (B) The birth rate remains high while the death rate falls sharply.
In Stage 2 of the Demographic Transition Model, also known as the Early Expanding stage, a population experiences very rapid growth. This explosion occurs because death rates fall significantly due to improvements in nutrition, sanitation, and medical care. However, birth rates remain high because social norms and family practices take longer to change. The large gap between the high birth rate and the falling death rate results in a high rate of natural increase, leading to a significant expansion of the total population.

91. (C) Mixed land uses and potential land use conflicts.
The rural-urban fringe is a transitional zone on the outskirts of a city where urban and rural land uses are interspersed. This area is characterized by a mix of housing estates, agricultural fields, industrial sites, and recreational spaces. Because of the rapid change and the variety of activities occurring in close proximity, the fringe is often a site of intense land-use conflicts. As the city expands, the pressure for development increases, leading to a dynamic and frequently unplanned landscape that challenges traditional administrative boundaries.

92. (A) Both A and R are true and R is the correct explanation of A.
Urbanization is closely linked to economic development. Historically, the process of industrialization creates many jobs in factories and services located in cities, attracting people from rural agricultural areas. This shift results in a higher proportion of the population living in urban centers. Therefore, the level of urbanization is a common indicator of a nation's development status. In developed countries, this transition occurred gradually alongside the Industrial Revolution, while many developing nations are currently experiencing rapid urbanization as their economies modernize and diversify.

93. (C) The role of profit maximization for firms, leading to a more complex landscape.
August Lösch expanded upon Christaller's Central Place Theory by introducing the principle of profit maximization for individual businesses. Unlike Christaller, who assumed a rigid and fixed hierarchy, Lösch argued that different firms have different spatial requirements to be profitable. His model allowed market areas to vary in size and overlap, creating a more complex and economically realistic urban landscape. This approach emphasizes that economic competition and the pursuit of profit drive the spatial organization of settlements, leading to sectors with high and low densities of central places.

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94. (A) Houses are built close together, often around a central nucleus.
A compact or nucleated rural settlement is one where houses and other buildings are clustered tightly together. This type of settlement often develops around a central feature, such as a water source, a place of worship, or a village green. Compact settlements are common in fertile agricultural areas where farmers live together for social interaction and mutual defense, traveling outward to work in their surrounding fields. This arrangement facilitates the shared use of resources and the development of strong social bonds within the rural community.

95. (C) The prospect of higher-paying jobs in another region.

introduced the concept of intervening obstacles, such as physical distance, legal barriers, or the cost of moving, which can prevent or delay migration. Furthermore, Lee highlighted the role of personal factors, including an individual's perception of conditions at the origin and destination. This comprehensive approach acknowledges the complexity of human movement beyond simple economic motivations or environmental pressures.

68. (A) A zone of declining housing, immigrant settlements, and encroaching light industry.
In the Concentric Zone Model, the zone of transition is the area immediately surrounding the central business district. It is characterized by a mix of land uses and is often in a state of physical decline. Older residential buildings are frequently converted into low-cost housing for immigrants and low-income workers. This zone also experiences the encroachment of light manufacturing and commercial activities. It is a dynamic part of the city where social and economic changes are most visible and rapid.

69. (C) The maximum distance people are willing to travel to acquire a good.
In Central Place Theory, the range refers to the maximum distance a consumer is prepared to travel to purchase a specific good or service. This distance is influenced by the value and frequency of the item; people will travel much further for specialized medical care or high-end luxury items than for basic groceries. The range defines the outer boundary of a central place's market area for that particular good. Understanding the range is essential for determining the spatial distribution of settlements and services.

70. (A) 3, 2, 1
The history of population theory shows a progression of ideas over several centuries. Thomas Malthus published his seminal work on population and food supply in the late eighteenth century. David Ricardo followed in the early nineteenth century with his economic theories, including the iron law of wages. Michael Sadler later proposed his Destiny Theory in the mid-nineteenth century as a response to the Malthusian perspective. Therefore, the correct chronological sequence of these significant contributions to demographic thought is Malthus, Ricardo, then Sadler.

71. (D) Functional role in the global economy.
While a megacity is defined primarily by its large population size, a global city is distinguished by its strategic role in the international economic system. Global cities serve as major hubs for international finance, global trade, and corporate decision-making. They host the headquarters of multinational corporations and provide advanced producer services that coordinate global production. Therefore, a city can be a megacity due to its size without being a global city if it lacks these significant international economic functions and connections.

72. (B) Timeliness, as the data can be several years out of date by the time it is fully processed and released.
A major criticism of census data is the significant time lag between data collection and the publication of results. Because a census involves counting the entire population and gathering extensive information, the process of verifying and analyzing the data is extremely time-consuming. By the time the final reports are released, the demographic situation may have already changed significantly. This lack of timeliness can limit the usefulness of census data for immediate policy decisions or for responding to rapid population shifts.

73. (C) The zone displaying mixed urban and rural features with rapid land use changes.
Peri-urban areas are transitional zones located on the outskirts of cities, beyond the established suburbs. These areas exhibit a blend of urban and rural characteristics, such as new residential developments interspersed with agricultural land and small-scale industries. They are sites of rapid change and intense land-use competition as the urban area continues to expand. Peri-urban zones often face challenges like unplanned growth, inadequate infrastructure, and environmental degradation, reflecting the complexities of the rural-to-urban transition in many rapidly developing regions.

74. (D) The availability of food
Thomas Malthus argued that the ultimate limit to population growth is the availability of food.

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and the rise of a new merchant class. He argued that the medieval city was a "commercial republic" that developed independently of the earlier feudal and religious structures. According to the Pirenne Thesis, the growth of long-distance trade created the need for permanent trading settlements, which eventually gained political autonomy and became the foundations for the modern urban centers of Europe.

103. (D) The failure of the formal economy to absorb a rapidly growing urban labor force.
In many cities of developing countries, the formal economy cannot create enough regulated jobs to keep pace with rapid population growth and rural-to-urban migration. Consequently, many urban dwellers must turn to the informal sector for their livelihoods. This sector includes untaxed and unregulated activities like street vending, day labor, and small-scale home production. While providing a necessary survival strategy, the informal sector is often characterized by low wages and a lack of legal protections, reflecting the structural challenges of urbanization in these regions.

104. (C) The population of a city is inversely proportional to its rank.
The rank-size rule describes a balanced urban system where the population of any city is related to its position in the hierarchy. According to this rule, if the largest city has a certain population, the nth-ranked city will have one-nth of that population. This results in a distribution where there are many cities of varying sizes, rather than one city dominating the entire nation. This pattern is often found in large countries with a long history of urban development and a decentralized political and economic system.

105. (A) 3, 2, 4, 1
The Demographic Transition Model tracks the historical shift in population patterns. It begins with Stage 1 (3), where both birth and death rates are high and fluctuating. Stage 2 (2) follows, as death rates fall sharply while birth rates stay high, causing rapid growth. In Stage 3 (4), birth rates begin to decline, and population growth slows. Finally, Stage 4 (1) is reached, where both birth and death rates are low, leading to a stable population. This chronological sequence is essential for understanding demographic change.

106. (A) More jobs than bedrooms.
According to Joel Garreau, a defining characteristic of an edge city is that it must have more jobs than bedrooms. This means that the area has a significant concentration of office space and retail businesses, attracting many workers and shoppers from the surrounding region. Unlike traditional residential suburbs, edge cities function as major employment hubs on the outskirts of metropolitan areas. This shift from purely residential to commercial and economic activity is a key feature of the polycentric urban growth seen in late twentieth-century North America.

107. (D) The provision of uniform, integrated public housing for all income groups.
Social segregation in the city is the spatial separation of different socioeconomic, ethnic, or racial groups into different residential areas. It is driven by factors such as income inequality, housing discrimination, and the natural tendency of people to live near others with similar backgrounds. The provision of uniform and integrated public housing for all groups would actually work to reduce segregation by creating mixed-income and multi-ethnic communities. Therefore, such inclusive housing policies are a solution to segregation rather than a cause of it in urban environments.

108. (B) The actual reproductive performance of a population.
In demography, fertility refers to the actual number of children born to individuals or a population. It is measured using various rates, such as the crude birth rate or the total fertility rate. This is distinct from fecundity, which is the physiological ability or potential of a person to conceive and have children. While fecundity defines the biological limits of reproduction, fertility reflects the actual outcome influenced by social, economic, and personal factors, including marriage patterns, contraceptive use, and family preferences.

109. (B) It is a lower-density residential area on the outskirts of a city.
A suburban area is a residential district located on the edges of a larger urban center. It is typically characterized by lower population density than the central city, with more spacious housing and

NODIA

a greater emphasis on private gardens and open spaces. Suburbs are primarily residential but remain economically tied to the main city, with many residents commuting there for work. The growth of suburbs, known as suburbanization, has been a major trend in urban development, driven by improvements in transportation and the desire for a quieter lifestyle.

110. (A) 1, 2 and 4
Anti-natalist policies aim to slow population growth by reducing birth rates. Typical strategies include promoting the use of contraceptives, raising the legal age of marriage to delay childbearing, and improving female education and literacy, which is strongly linked to lower fertility. Providing cash bonuses for large families, however, is a pro-natalist strategy used to encourage births. Therefore, only the strategies focused on reducing fertility and increasing family planning awareness are considered anti-natalist, reflecting a government's effort to achieve a sustainable and manageable population size.

111. (A) A city grows outward in a series of rings from a central point.
The Concentric Zone Model, proposed by Ernest Burgess, is based on the fundamental assumption that a city grows outward from a central business district in a series of five distinct rings. Each ring represents a specific type of land use and social group, with the most intensive commercial activity at the core and the highest socioeconomic residential areas on the outer periphery. This model emphasizes the role of competition for space and accessibility as the primary drivers of urban spatial organization and the outward expansion of city zones.

112. (B) Distribution of the working population among different industries and occupations.
Occupational structure refers to how a country's workforce is distributed across different sectors of the economy, such as primary (agriculture, mining), secondary (manufacturing, construction), and tertiary (services, trade). Analyzing this structure provides deep insights into a nation's level of economic development and its industrial priorities. For example, a high percentage of workers in the primary sector typically indicates a developing economy, while a dominance of service and information-based jobs is characteristic of a highly developed, modern industrial nation with an advanced economy.

113. (A) Both Statement I and Statement II are true.
Thomas Malthus's theory of population has been widely criticized for its failure to predict the impact of technological innovation. Statement I correctly identifies that he underestimated how technology could transform production. Statement II is also true, as the Green Revolution of the twentieth century demonstrated that agricultural yields could be dramatically increased through science and technology, contradicting his assumption that the food supply would only grow arithmetically. These advancements have allowed the global food supply to keep pace with a rapidly expanding human population.

114. (A) Very slow growth for most of human history, followed by exceptionally rapid growth in the last 200 years.
The history of the world's population is marked by a long period of extremely slow growth followed by a modern explosion. For thousands of years, high birth rates were balanced by high death rates due to disease, famine, and war. However, starting around the time of the Industrial Revolution, improvements in sanitation, medicine, and food production led to a sharp decline in death rates. This change triggered an unprecedented and exceptionally rapid increase in the global population over the last two centuries, transforming human society and the environment.

115. (A) Areas of planned settlement, such as on plains with a grid system of roads and fields.
A rectangular rural settlement pattern is typically found in regions where land was surveyed and divided systematically, often as part of a government planning effort. This is common on flat plains where a grid system of roads and fields was established. Houses and farm buildings are built along these straight lines, creating a neat and orderly geometric arrangement. This pattern reflects a high degree of organization and is often associated with modern agricultural development in areas like the Great Plains of North America or planned agricultural colonies.

116. (B) It was closely linked with the Industrial Revolution.

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Urbanization in developed countries was a long-term process that occurred alongside the Industrial Revolution in the eighteenth and nineteenth centuries. The shift from agrarian to industrial economies created a massive demand for factory labor, pulling millions of people from rural areas into rapidly growing cities. This transition was supported by improvements in agricultural productivity and transportation. Unlike the rapid, often unplanned urbanization seen in many developing nations today, this historical process in the West was fundamentally driven by the growth of manufacturing and technological innovation.

117. (C) The idea of a hierarchy of central places with fixed k-values (k=3, k=4, k=7).
Walter Christaller's Central Place Theory is built on a rigid hierarchy of settlements where each level is determined by fixed k-values. These values represent different principles, such as marketing (k=3), transportation (k=4), or administration (k=7), and dictate how many smaller places are served by a larger one. While August Lösch also used hexagons to model market areas, he rejected this strict hierarchy. Lösch's model allowed for more flexibility and a complex overlapping of market areas, making the concept of fixed k-values unique to Christaller's original theoretical framework.

118. (B) The conversion of agricultural land for urban or industrial development.
Land acquisition and transactions have become a contemporary problem in rural settlements, primarily due to the intense pressure for urban and industrial expansion. As cities grow, they often need to acquire surrounding agricultural land for housing, factories, or infrastructure projects. This process frequently leads to conflicts over fair compensation, the displacement of farmers, and the loss of traditional livelihoods. The conversion of productive farmland for non-agricultural uses is a significant social and economic issue that requires careful policy management to balance development needs with rural preservation.

119. (C) Social segregation.
Social segregation is the spatial separation of different socioeconomic, ethnic, or racial groups within a city. It occurs when people from similar backgrounds or income levels cluster in specific neighborhoods, creating a patchwork of distinct communities. This phenomenon is driven by various factors, including income inequality, housing costs, and discrimination, as well as the natural tendency of people to seek out others with shared cultural or social identities. Segregation can lead to unequal access to resources and opportunities, making it a key focus for urban planners and social geographers.

120. (D) 1, 2, 3, 4 and 5
Mortality rates in a population are determined by a wide range of factors. Access to quality healthcare and medicine significantly reduces deaths, as do improvements in nutrition and sanitation. The prevalence of infectious and chronic diseases also plays a major role. Furthermore, environmental factors, such as pollution and occupational hazards, and social conditions, like stability and the absence of war, are critical determinants of life expectancy. All these elements together influence the overall health and survival patterns of a population across different regions and time periods.

121. (B) How well the selected sample represents the entire population.
The reliability of data from a sample survey depends fundamentally on the quality of the sampling process. For the results to be valid for the whole population, the selected sample must be a true miniature representation of the entire group. This means that all segments of the population should have a known chance of being included. If the sample is biased or non-representative, the survey results will be inaccurate and misleading. Therefore, rigorous sampling techniques are essential for generating reliable demographic and social statistics through survey research.

122. (C) Lewis Mumford
Lewis Mumford was an influential urban theorist who viewed the city as more than just a place of economic activity. He famously described the city as a "cultural container" that preserves and transmits human heritage across generations. According to Mumford, the city facilitates social interaction and the development of institutions, making it a vessel for human civilization and innovation. His perspective emphasizes the symbolic and spiritual dimensions of urban life, arguing that the social and cultural functions of

NODIA

176. (B) The expansion of the informal sector.
The expansion of the informal sector in cities is a direct manifestation of poverty and the lack of formal employment opportunities. When the formal economy cannot create enough regulated jobs for a rapidly growing urban population, people must find alternative ways to survive. They engage in untaxed and unregulated activities like street vending, casual labor, and small-scale home production. While these activities provide a vital income for the urban poor, they lack job security, benefits, and legal protections, reflecting the deep socioeconomic disparities and challenges of urbanization in many developing nations.

177. (A) Several independent growth centers or nodes.
The Multiple Nuclei Model, proposed by Harris and Ullman, suggests that cities do not develop from a single central point. Instead, they grow around several independent nodes or nuclei, such as a port, a university, an industrial park, or a suburban shopping center. Each of these centers attracts specific and often mutually supportive land uses. This model recognizes that modern cities are complex and polycentric, where different activities have diverse location needs and where the repulsion of incompatible land uses, like heavy industry and high-end housing, shapes the overall urban landscape.

178. (A) The development of specialized, non-agricultural occupations.
A key component of Gordon Childe's "Urban Revolution" theory was the development of specialized, non-agricultural occupations. He argued that once an agricultural surplus was created, some people could stop farming and become full-time specialists, such as artisans, priests, and administrators. These individuals lived in centralized urban settlements and relied on the surplus food produced by others. This specialization led to increased social complexity, the emergence of a ruling class, and the development of organized systems of governance and record-keeping, marking the transition from simple villages to complex urban civilizations.

179. (C) Both A and B.
A high sex ratio, meaning significantly more males than females, can be caused by several factors. In some societies, a cultural preference for sons may lead to female infanticide or neglect, resulting in fewer girls surviving. Alternatively, an imbalanced sex ratio can be the result of large-scale migration. For example, some regions attract many male guest workers for jobs in construction or industry, while the women remain in their home countries. Both these social and economic processes can lead to a distorted population structure with significant implications for marriage patterns and social stability.

180. (C) 1, 2 and 3 only
A satellite town is a planned community that is physically separate from a larger central city, often divided by a greenbelt or open land. Unlike a simple residential suburb, a satellite town possesses its own economic base and provides local employment and services for its residents. While it remains functionally linked to the main metropolis through transportation networks, it is designed to be a more self-contained and independent urban settlement. This arrangement helps in managing urban expansion while offering a more balanced environment than a purely residential commuting suburb.

181. (B) The traffic principle (k=4)
In Christaller's Central Place Theory, different principles result in different settlement hierarchies, represented by k-values. The traffic principle, or k=4, is designed to create the most efficient transportation network. In this arrangement, central places are located along major travel routes, minimizing the distance between settlements and creating a system with the smallest number of central places needed to serve the population. This principle emphasizes the role of transport and accessibility in shaping the spatial distribution of towns and cities, providing a more streamlined hierarchy than the marketing or administrative principles.

182. (B) Intentional misreporting by respondents or errors in data processing
Population data reliability is often compromised during the collection or handling phases. Misreporting occurs when respondents provide inaccurate information, such as rounding their ages or falsifying income due to social stigma or privacy concerns. Additionally, errors can arise during data entry, transcription, or processing by statistical agencies. Ensuring accuracy requires rigorous training for enumerators, clear

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secondary, and tertiary education, along with literacy rates. High educational levels are associated with better economic prospects, improved health outcomes, and lower fertility rates. Governments use this data to plan education services and evaluate the effectiveness of their social and economic development policies.

130. (C) Stark spatial inequalities, poverty, and social exclusion.
From a geographical perspective, crime in cities is often strongly linked to spatial inequalities and social exclusion. High concentrations of poverty in specific neighborhoods, combined with a lack of access to quality education, employment, and public services, can create a sense of marginalization and frustration. This social exclusion, where certain groups are denied the opportunities available to others, is a major driver of social instability and crime. Addressing urban crime therefore requires not just policing, but also efforts to reduce economic disparities and promote social integration across all urban areas.

131. (A) Both A and R are true and R is the correct explanation of A.
Global cities are essential nodes in the modern world economy, acting as primary centers for the management and coordination of international finance and trade. They are identified as key command and control centers because they concentrate high-level functions such as corporate headquarters and advanced producer services like law, accounting, and advertising. These activities allow global cities to manage the complex and geographically dispersed networks of global production. Their influence extends far beyond their own national borders, making them the most significant hubs in the global urban hierarchy.

132. (A) Population density and fertility.
Michael Sadler proposed a theory of population that directly challenged the Malthusian view. His "Destiny Theory" posited that human fertility is not a constant but is inversely related to population density. According to Sadler, as the density of a population increases and a society becomes more advanced and crowded, the natural urge to reproduce decreases. He believed that this was a natural self-regulating mechanism that would prevent overpopulation and ensure that human growth would eventually stabilize without the need for the harsh positive checks predicted by Malthus.

133. (A) 1 and 3
Lewis Mumford's theory on the origin of towns emphasizes the social and cultural aspects of urban life. He argued that the early city was primarily a "container" for human culture, rituals, and social interaction. Mumford also highlighted the role of powerful social institutions, represented by the king and the citadel, in the development of the first urban settlements. Unlike theorists who saw the city only as an economic machine, Mumford believed that the spiritual and social gathering of people was the true catalyst for the creation of the city.

134. (B) The growth of megacities and primate cities is a dominant feature.
A major trend of urbanization in many developing countries today is the explosive growth of very large urban areas, including megacities with over ten million people and primate cities that dominate their national systems. This rapid urban expansion is often driven by massive rural-to-urban migration and high rates of natural increase within the cities. This trend creates significant challenges, as the growth frequently outpaces the development of infrastructure and formal employment, leading to issues like urban poverty, social exclusion, and the expansion of large informal settlements.

135. (A) The process of urbanization, especially in developing countries.
Rural-to-urban migration is one of the most powerful drivers of the urbanization process, particularly in the developing world. As people move from the countryside to cities in search of better economic opportunities, services, and lifestyles, the proportion of the population living in urban areas increases. This migration contributes significantly to the growth of cities and the transformation of societies from rural-agrarian to urban-industrial. While it fuels urban expansion, it also creates challenges for both the source and destination areas, including the pressure on urban infrastructure and rural depopulation.

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the city are as vital as its economic and political roles.

123. (C) Disproportionately larger and more significant than other cities in the system.
The law of the primate city describes an urban structure where the largest city is disproportionately bigger than any other city in the country. A primate city is not just larger in population but also dominates the nation's political, economic, and cultural life. It often centralizes a country's investment and resources, creating a massive gap between it and the second-ranked city. This pattern is common in many developing nations and formerly colonized countries, where urbanization has been heavily concentrated in a single, massive metropolitan hub.

124. (A) A combination of natural increase within cities and rural-to-urban migration.
In many developing countries, the rapid growth of cities is driven by two main factors. First, rural-to-urban migration continues as people move to cities in search of better jobs and services. Second, high rates of natural increase occur within the urban areas themselves because birth rates remain relatively high while death rates have fallen due to improved medical care. Together, these factors lead to explosive urban growth, often outpacing the government's ability to provide adequate housing, infrastructure, and essential public services for the expanding population.

125. (C) Demographic Transition Model
Urban land use models are theoretical frameworks used to explain the internal spatial organization of cities. Common examples include the Concentric Zone Model, the Sector Model, and the Multiple Nuclei Model. These models focus on how different activities and social groups are distributed within the urban environment. In contrast, the Demographic Transition Model is a theory that describes how a country's population changes over time from high birth and death rates to low birth and death rates. It is a demographic model, not an urban land use model.

126. (C) Pro-natalist policy
A pro-natalist policy is a government strategy designed to encourage people to have more children and increase the national birth rate. These policies are often implemented in countries facing the challenges of an aging population and a shrinking workforce. Common measures include offering financial incentives like family allowances, providing subsidized or free childcare, and granting extended maternity and paternity leave. By reducing the economic and social costs of raising children, the state aims to boost fertility and ensure a sustainable demographic future for the nation.

127. (C) Changes the age, sex, and ethnic composition of both the source and destination areas.
Migration has profound demographic consequences because it involves the selective movement of people. Migrants are typically young adults, often males in certain contexts, and they carry their cultural and ethnic identities with them. As a result, migration changes the age and sex structure of the population in both the source area, which may see a loss of young workers, and the destination, which sees an influx of them. This process also increases the ethnic and cultural diversity of receiving areas, transforming the social landscape of both regions significantly.

128. (A) P-3, Q-1, R-2, S-4
Urban geography includes several key models developed by influential theorists. Ernest Burgess proposed the Concentric Zone Model, suggesting cities grow in rings. Homer Hoyt formulated the Sector Model, emphasizing transportation wedges. The Multiple Nuclei Model was developed by Harris and Ullman, highlighting cities with several distinct centers. Finally, Walter Christaller is famous for Central Place Theory, which explains the distribution and hierarchy of settlements. Understanding these associations is essential for analyzing the diverse theories that describe the internal structure and spatial arrangement of modern urban areas.

129. (C) The distribution of the population according to the highest level of education completed.
Educational levels in a population refer to the distribution of individuals based on their highest attained level of schooling or training. This characteristic is a key indicator of a nation's human capital and social development. It is typically categorized into levels such as primary,

geography and human history on where people live.

143. (A) 1, 2, 3 and 4
Rural settlements today face a range of complex contemporary problems. Rapid rural-urban migration leads to depopulation, especially among the young and productive age groups. Simultaneously, the conversion of fertile agricultural land into industrial or residential sites causes significant changes in traditional land use. This process often involves difficult legal and social issues surrounding land acquisition. Furthermore, many rural communities continue to struggle with a lack of basic infrastructure and essential services compared to urban centers. All these factors together challenge the sustainability and traditional character of rural life.

144. (D) The law of diminishing returns and wages
David Ricardo's perspective on population was closely tied to his economic theories, particularly the iron law of wages and the law of diminishing returns in agriculture. He argued that as the population grows, more marginal land must be brought into cultivation, leading to higher food prices and diminishing returns. This economic pressure, in turn, keeps wages at a level that only just allows for the subsistence of the working class. Ricardo's work emphasized how population growth and economic laws together determine the long-term distribution of wealth and wages in society.

145. (A) Overcrowding, substandard housing, and insecure tenure.
Slums are residential areas in cities that are characterized by a lack of basic services and poor living conditions. They are often overcrowded, with houses built close together using non-durable materials. A key feature of slums is insecure tenure, meaning residents often lack legal rights to the land and face the constant threat of eviction. Slums are common in rapidly urbanizing cities where the demand for affordable housing far exceeds the supply, forcing low-income populations and recent migrants into these informal and often marginalized urban settlements.

146. (D) The roles of agricultural technology and contraception in reducing fertility rates.
A major limitation of Thomas Malthus's eighteenth-century theory was its failure to foresee significant developments in technology and social practices. He underestimated the potential of agricultural technology, such as the use of fertilizers and machinery, to vastly increase food production beyond arithmetic growth. Additionally, Malthus did not anticipate the widespread adoption of modern contraception and the resulting decline in fertility rates as societies developed and urbanized. These advancements have allowed the human population to grow far larger than Malthus predicted without the catastrophic food shortages he considered inevitable.

147. (C) 10 million
A megacity is defined by the United Nations as an urban agglomeration with a total population of ten million or more inhabitants. These massive cities are hubs of intense economic, social, and cultural activity, but they also face enormous challenges in terms of infrastructure, housing, and the provision of public services. The number of megacities in the world has grown rapidly in recent decades, particularly in Asia and Africa, reflecting the global trend of massive urbanization and the concentration of populations in a few giant metropolitan centers.

148. (C) Statement I is false, but Statement II is true.
The Demographic Transition Theory is a powerful framework but is not a universal law. Statement I is false because countries do not all follow the same path or timing; cultural and political factors can significantly alter the transition. Statement II is true, as the theory accurately describes the historical shift from high to low birth and death rates experienced by many nations as they modernise and undergo industrialization. This transition reflects broad social and economic changes, such as improved healthcare and increased education, that eventually lead to stable population growth.

149. (C) Gentrification
Gentrification is the process by which a neighborhood's social and economic character is transformed through the influx of more affluent residents and reinvestment. This typically involves the renovation of older, deteriorating housing in lower-income areas. As property

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136. (B) Stage 4
Stage 4 of the Demographic Transition Model is characterized by both low birth rates and low death rates. In this stage, a society has reached a high level of economic development, urbanization, and education. Improved healthcare and high standards of living have stabilized death rates, while changes in social values and the widespread use of family planning have brought birth rates down. As a result, the population growth is very slow or zero, and the overall population size becomes stable, often showing an older age structure as life expectancy increases.

137. (B) Population Density
Population density is a fundamental measure of how a population is distributed across a given area. It is typically expressed as the number of people per unit of land area, such as per square kilometer. This metric helps geographers understand the intensity of human settlement and the pressure on resources in different regions. While fertility, growth rates, and sex ratios describe specific demographic characteristics or trends, population density specifically quantifies the spatial distribution of people, identifying areas of high concentration and those that are sparsely populated.

138. (B) 3, 2, 1
The internal structure of the industrial city has been described through several models that emerged chronologically. Ernest Burgess proposed the Concentric Zone Model in the early 1920s, emphasizing outward growth in rings. This was followed by Homer Hoyt's Sector Model in 1939, which introduced the role of transportation corridors in creating wedges of land use. Finally, Harris and Ullman developed the Multiple Nuclei Model in 1945, recognizing that modern cities develop around several independent centers. Therefore, the correct chronological order of these models is 3, 2, then 1.

139. (B) To provide a continuous record of demographic events like births and deaths.
Vital statistics registration systems are designed to provide an ongoing and official record of major demographic events within a population. These events include births, deaths, marriages, and divorces as they occur. Unlike a census, which is a periodic and comprehensive count, vital statistics provide continuous data that allows governments and researchers to track population changes in real time. This information is essential for calculating rates of natural increase, understanding public health trends, and planning for various social services and infrastructure needs based on current demographic realities.

140. (A) P-4, Q-1, R-2, S-3
Modern urban landscapes feature several distinct forms. A suburban area is primarily residential and located on the outskirts of a city. A satellite town is a planned, self-contained community functionally linked to a larger metropolis. The rural-urban fringe is the immediate transitional zone where city and countryside land uses mix. Finally, peri-urban areas are the dynamic zones of rapid change located beyond the immediate suburbs. Understanding these terms is crucial for studying urban growth, land-use patterns, and the complex relationships between central cities and their surrounding metropolitan regions.

141. (C) A is true but R is false.
In many developing countries, the informal sector is a vital source of employment, providing livelihoods for millions of urban residents who cannot find work elsewhere. Assertion A is therefore true. However, Reason R is false because the primary reason for the informal sector's growth is that the formal economy does not grow fast enough to absorb the rapidly expanding urban labor force. This gap between population growth and formal job creation forces people into unregulated, small-scale activities to survive, reflecting the structural economic challenges of rapid, unplanned urbanization.

142. (C) Highly uneven, with concentrations in a few major clusters.
The distribution of the world's population is extremely uneven across the globe. Large parts of the Earth, such as polar regions, deserts, and high mountain ranges, are sparsely populated due to harsh environments. In contrast, the majority of the population is concentrated in a few major clusters, such as East Asia, South Asia, and Europe. These areas are characterized by favorable climates, fertile soils, and long histories of human settlement. This highly uneven pattern reflects the significant influence of both physical

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156. (B) Stage 2
The phase of 'population explosion' occurs during Stage 2 of the Demographic Transition Model. In this stage, death rates fall rapidly due to improvements in nutrition, sanitation, and medical technology. However, birth rates remain high because social norms and family practices take longer to change. This create a massive gap between births and deaths, leading to an extremely high rate of natural increase. This period of rapid growth is common in developing countries as they begin to modernize and is a major focus for global population studies and international development planning.

157. (C) Megalopolis
Rural settlement patterns describe how people live in the countryside. Common types include compact settlements, where houses are clustered; hamlets, which are small groups of dwellings; and dispersed settlements, where farmsteads are scattered. In contrast, a megalopolis is a term used in urban geography to describe a massive urban region formed by the merging of several large metropolitan areas and their surrounding suburbs. It represents the highest level of urban agglomeration and is the opposite of the small, simple, and agricultural nature of traditional rural settlements.

158. (A) Population Pyramid
A population pyramid is a specialized bar graph used by demographers to visualize the age and sex composition of a population. It displays the proportion of males and females in different age groups, typically in five-year intervals. The shape of the pyramid provides immediate insight into a population's history and future trends, such as birth rates, death rates, and life expectancy. For example, a wide base indicates a high birth rate, while a narrow top reflects the aging process. It is the most common and effective tool for analyzing demographic structures.

159. (C) Has its own economic base and is more independent.
While both are urban settlements on the outskirts of a larger city, a satellite town differs from a suburb in its level of independence. A suburb is primarily a residential community where most people commute to the central city for work. In contrast, a satellite town is a more planned and self-contained settlement with its own economic base, providing local employment and services. While it remains functionally linked to the nearby metropolis, a satellite town is more independent and less reliant on the central city for day-to-day economic and social activities.

160. (C) Henri Pirenne
Henri Pirenne was a Belgian historian whose work profoundly influenced the study of medieval urban origins. He argued that the re-emergence of towns in Europe after the "Dark Ages" was fundamentally driven by the resurgence of long-distance trade across the Mediterranean and Northern Europe. According to Pirenne, the rise of a new merchant class and the creation of trading hubs led to the development of autonomous urban centers. This perspective, known as the Pirenne Thesis, emphasizes economic activity and commerce as the primary catalysts for the rebirth of European urban civilization.

161. (B) The formation of marginalized communities with limited access to services.
Social exclusion in cities is a process where certain groups are denied full participation in society, leading to the formation of marginalized communities. These groups often live in disadvantaged neighborhoods with poor access to quality housing, education, healthcare, and employment opportunities. This spatial and social isolation prevents them from benefiting from the city's overall growth and prosperity. Social exclusion can lead to increased inequality, social tension, and the persistence of urban poverty, as those excluded are trapped in a cycle of disadvantage with limited means to improve their socio-economic status.

162. (A) Near a major airport or at the intersection of highways on the outskirts of a larger city.
An edge city is a substantial urban concentration that develops on the outskirts of a metropolitan area, typically at strategic locations such as major highway interchanges or near large airports. These areas provide significant office and retail space, often functioning as independent economic hubs. The growth of edge cities is driven by the decentralization of businesses from the central city in search of lower costs and better accessibility for an automobile-dependent workforce. They represent a new, polycentric

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form of urban development that emerged in late twentieth-century North America and beyond.

163. (B) Lowering fertility rates.
There is a strong and consistent inverse relationship between female literacy and fertility rates. Improving education and employment opportunities for women often leads to delayed marriage and childbearing. Educated women are more likely to be aware of and use contraception and often desire smaller family sizes to balance work and home life. Therefore, government policies focused on female empowerment and education serve as effective, indirect anti-natalist strategies. These efforts contribute to lower birth rates, helping countries achieve a more stable population and improving the overall socio-economic well-being of families and communities.

164. (C) Statement I is true, but Statement II is false.
Urbanization is the process by which a country's population increasingly shifts from rural to urban areas, as correctly defined in Statement I. However, Statement II is false because the levels of urbanization, or the proportion of people living in cities, are actually highest in highly developed regions like North America, Europe, and Oceania. While Africa and Asia are currently experiencing the fastest rates of urban growth, they still have a larger proportion of their total populations living in rural areas compared to the more fully urbanized continents of the developed world.

165. (B) P-3, Q-2, R-1, S-4
Central Place Theory uses specific terms to describe the hierarchy and distribution of settlements. A central place is a town that provides goods and services to its surrounding area. The threshold is the minimum market size needed for a business to be profitable. The range is the maximum distance consumers are willing to travel for a specific item. A central good or service is the item offered by the settlement. Together, these concepts help explain why cities and towns are spaced the way they are across a uniform landscape to efficiently serve the population.

166. (B) Internal migration
Internal migration refers to the movement of people from one place to another within the borders of a single country. This includes moving between states, provinces, or from rural areas to cities. Unlike international migration, it does not involve crossing national boundaries or changing citizenship. Internal migration is often driven by economic factors, such as seeking better jobs, or by social reasons like joining family. It is a major factor in the internal distribution of a country's population and is a key driver of the process of urbanization worldwide.

167. (D) Political affiliation
Social Area Analysis uses three classic variables to identify and map the spatial distribution of social groups within urban areas. These are socioeconomic status, which includes income, occupation, and education; family status, reflecting age, household size, and lifestyle; and ethnic status, which examines racial or national origins. By analyzing these dimensions, researchers can understand how populations are sorted into different residential neighborhoods, creating a segregated urban landscape. Political affiliation, while important in other contexts, is not one of the fundamental variables used in this specific geographical method to study urban residential patterns.

168. (A) 1, 2 and 4
Urbanization in developed countries was a long-term process that began during the Industrial Revolution. It occurred over several generations, allowing cities to gradually adapt their infrastructure and social systems. This historical process led to high levels of urban concentration relatively early, as millions of people moved from the countryside to work in manufacturing and service jobs. While these cities also faced serious social problems, like overcrowding and slums, the overall process was fundamentally driven by industrial and economic growth. Statement 3 is incorrect because the service sector only became dominant much later.

169. (C) It assumes a uniform landscape and does not account for topography or transport corridors.
A primary criticism of the Concentric Zone Model is its extreme simplicity and its assumption of a perfectly uniform, flat landscape. The model fails to account for the significant influence of

physical features like mountains or rivers, which can distort urban growth. More importantly, it ignores the critical role of transportation corridors, such as rail lines and major highways, in shaping city structure. Critics argue that modern cities are far more complex than simple rings, with land use often developing in sectors or around multiple nuclei rather than following a rigid circular pattern.

170. (A) Both A and R are true and R is the correct explanation of A.
The rank-size rule and the law of the primate city represent two very different types of urban hierarchies. The rank-size rule describes a balanced system with many cities of varying sizes, while the primate city rule describes a system dominated by a single, massive city. Therefore, a country cannot simultaneously have a perfect rank-size distribution and a primate city, as the latter would violate the mathematical relationship required by the former. These two models provide different lenses for understanding how urban population and influence are distributed within a nation's settlement system.

171. (B) Administrative, economic, cultural, and residential.
The functions of urban areas are the diverse roles and activities that cities and towns perform for their residents and the surrounding region. These can be broadly classified into several categories. Administrative functions involve governance and public services. Economic functions include trade, finance, and manufacturing. Cultural functions encompass education, religious activities, and the arts. Finally, residential functions provide housing and community space for the urban population. Most cities are multifunctional, meaning they perform several of these roles simultaneously, though some may specialize in one area, such as a capital city or an industrial hub.

172. (C) National census
A national census is the most comprehensive and detailed source of population data available to a country. It aims to collect information on every individual within the territory, providing a definitive snapshot of demographic, social, and economic characteristics. However, because of the massive effort required to reach everyone and process the vast amount of data, a census is the most expensive and infrequent method of data collection, usually conducted only once every ten years. Despite these costs, it provides an essential baseline for all other population studies and government planning.

173. (A) In the long run, wages will always tend toward the minimum level necessary for subsistence.
David Ricardo's "iron law of wages" is an economic theory that links population growth to wage levels. He argued that in a competitive labor market, wages will naturally tend toward the minimum amount needed for a worker's basic survival. If wages rise above this level, the population will increase as workers have more children, leading to a surplus of labor. This increased supply then drives wages back down to the subsistence level. Ricardo believed this was an inevitable cycle that would keep the working class at a level of minimal economic well-being.

174. (D) A linear pattern
A linear settlement pattern is one where houses and other buildings are constructed in a long line, following a specific physical or man-made feature. This most commonly occurs along transportation routes like roads and railways or natural features such as riverbanks, levees, or coastlines. This arrangement provides residents with easy and direct access to the transport corridor or water source. Linear settlements are found in various environments, particularly in narrow valleys where flat land for building is limited and must be used efficiently along the available path.

175. (A) Displacement of farmers and loss of agricultural livelihoods.
As cities expand, they often require surrounding agricultural land for new housing, industry, and infrastructure. This process of land acquisition can lead to the displacement of rural communities and the loss of their traditional livelihoods. Many farmers find themselves forced to sell their land, often losing their primary source of income and being compelled to seek new work, often in the urban informal sector. This conversion of productive farmland is a significant social and economic consequence of urbanization, creating challenges for rural sustainability and the welfare of displaced agricultural populations.

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values and rents rise, the original, less wealthy residents are often displaced, unable to afford the cost of living in their transformed community. While gentrification can lead to physical improvements and a new economic base for the area, it also raises significant social concerns regarding equity, affordability, and the loss of traditional community identities.

150. (B) Because they benefit from agglomeration economies or are mutually supportive.
According to the Multiple Nuclei Model, certain activities cluster together because they gain advantages from proximity, a concept known as agglomeration economies. For example, businesses that rely on each other or on the same specialized labor force will benefit from being in the same area. Other activities may cluster because they have similar location requirements, such as heavy industries needing access to rail and water transportation. This natural tendency to form specialized nodes of activity, rather than a single center, drives the complex land-use patterns observed in many modern metropolitan cities.

151. (D) Christaller - Primate City
In urban geography, certain models are traditionally paired with their creators. Ernest Burgess developed the Concentric Zone Model, while Homer Hoyt proposed the Sector Model. Harris and Ullman are associated with the Multiple Nuclei Model. However, Walter Christaller is famous for Central Place Theory, not for the law of the primate city. The primate city concept was actually coined by Mark Jefferson. Identifying these correct pairings is important for understanding the different theoretical perspectives that have shaped our knowledge of how cities are organized and distributed spatially.

152. (A) An increase in the proportion of elderly people.
The 'graying' of a population, also known as population aging, refers to a demographic shift where the median age of a population increases. This is caused by a combination of declining birth rates and rising life expectancy. As fewer children are born and more people live longer, the proportion of elderly people in the society grows. This trend is particularly evident in many developed countries and has significant implications for public policy, including the sustainability of pension systems, the demand for healthcare services, and the size of the national labor workforce.

153. (B) Conducting more detailed sample surveys.
A primary purpose of a population census is to provide a comprehensive and accurate count of the entire population, which serves as a vital framework for other statistical research. Because a census covers everyone, it provides the detailed data needed to design and select representative groups for more specific sample surveys. These smaller surveys can then gather in-depth information on topics like employment, health, or housing more efficiently and frequently. Therefore, the census acts as an essential foundation, ensuring that all other population-based studies are accurately grounded in the national demographic reality.

154. (D) Louis Wirth
Louis Wirth was an influential sociologist who famously articulated the concept of "urbanism as a way of life." He argued that the unique characteristics of city life, such as large population size, high density, and social heterogeneity, produce distinct social and psychological impacts on urban dwellers. Wirth believed that urban environments lead to more impersonal, transitory, and specialized social interactions compared to rural communities. His work helped establish urban sociology by focusing on how the physical and demographic structure of the city shapes human behavior, social relationships, and the overall urban experience.

155. (A) 1, 2 and 3
Slums are characterized by several specific indicators of urban deprivation. Key features include inadequate access to safe water and sanitation, which poses significant health risks to residents. Overcrowding and high density are also hallmarks, with many people living in small, cramped dwellings. Furthermore, insecure tenure is a major issue, as residents often lack legal rights to the land and face the threat of eviction. While some slum housing may eventually be improved, the initial dwellings are typically made from non-durable materials, making Statement 4 incorrect for the basic definition of a slum.

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survey definitions, and robust quality control measures to detect and correct anomalies within the census or survey dataset. These steps are essential for maintaining the integrity of national demographic and social statistics.

183. (C) They are characterized by excellent access to public services like water and sanitation.
Urban slums are precisely defined by their lack of basic public services. They are a common feature of rapidly growing cities in developing countries where the demand for housing far exceeds the government's ability to provide infrastructure. Residents of slums typically face overcrowding, poor sanitation, and inadequate access to clean water. They also often have insecure tenure and live under the constant threat of eviction. While slums provide housing and a base for the informal workforce, their defining characteristic is the extreme deprivation of essential services and substandard living conditions.

184. (A) Very low population numbers and extremely slow growth.
The prehistoric period of human history was characterized by very low population numbers and extremely slow growth. For most of this time, humans lived as small groups of hunter-gatherers, and the world's population was limited by the carrying capacity of the natural environment. High birth rates were almost entirely balanced by high death rates due to disease, food insecurity, and environmental hazards. It was not until the development of agriculture and the subsequent Urban Revolution that population numbers began to rise more significantly, setting the stage for future growth.

185. (A) From the central city to its outskirts.
Suburbanization is the process by which populations and economic activities shift from the densely populated central areas of a city to residential communities on its outskirts. These outlying areas, known as suburbs, typically offer lower density and more living space while remaining economically and socially linked to the main metropolis. This movement is driven by factors such as improved transportation, the desire for a quieter lifestyle, and lower land costs. Suburbanization leads to the outward expansion of urban areas, often changing the land use of the surrounding rural-urban fringe.

186. (B) The location of major rivers and coastal plains.
On a global scale, population distribution is primarily determined by physical geography. People are overwhelmingly concentrated in areas with favorable environmental conditions, such as fertile coastal plains and the fertile valleys of major rivers. These locations provide easy access to water, transportation, and land suitable for agriculture, which have historically supported large human settlements. Conversely, extreme environments like high mountains, dense rainforests, and arid deserts are sparsely populated. This pattern highlights the fundamental role of natural resources and climate in shaping the spatial arrangement of the human population.

187. (B) Sector Model.
The Sector Model of urban land use, proposed by Homer Hoyt, describes the city as being organized into a series of pie-shaped wedges or sectors that radiate outward from the central business district. Hoyt argued that different types of residential, commercial, and industrial activities expand along major transportation routes like rail lines and highways. This creates a pattern where specific land uses follow these corridors, rather than developing in uniform rings. The model emphasizes that accessibility and the role of high-rent residential areas are the primary drivers of the city's overall structure and growth.

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188. (B) The birth rate begins to decline significantly.
In Stage 3 of the Demographic Transition Model, also known as the Late Expanding stage, the rate of population growth begins to slow down. This occurs because birth rates start to decline significantly due to several social and economic factors. These include improved access to education and employment for women, increased urbanization, and the widespread availability and use of contraception. While death rates also continue to fall or stabilize at a low level, the decrease in birth rates reduces the rate of natural increase, leading to a more moderate pace of population expansion.

189. (B) Both Statement I and Statement II are false.
Both statements regarding the informal sector are incorrect. The informal sector actually consists

228. (B) Process by which certain groups are denied full participation in society.
Social exclusion in an urban setting is a systematic process where certain groups or individuals are denied full participation in the economic, social, and political life of the city. This can include a lack of access to quality housing, employment, healthcare, and education. It is often driven by factors such as poverty, race, ethnicity, or gender. Excluded groups are frequently concentrated in disadvantaged neighborhoods with poor infrastructure and services. This process creates deep-seated inequalities and social tension, preventing marginalized populations from benefiting from the overall opportunities and prosperity of the urban environment.

229. (C) Provide goods and services to its surrounding population.
A key assumption of Walter Christaller's Central Place Theory is that the primary purpose of a settlement is to serve as a central place that provides goods and services to its surrounding population. This function determines the settlement's size, its location in relation to other places, and the range and threshold of the services it offers. According to this theory, urban settlements exist in a hierarchy based on the complexity and variety of the goods they provide, from small villages offering basic items to large cities providing specialized and high-order services.

230. (A) 1, 2, 3 and 4
Urban areas are characterized by a wide range of functions that serve their residents and the wider region. These include commercial and economic activities like trade and finance, and administrative functions related to governance and public services. Cities also serve as cultural and educational centers, hosting institutions like universities, museums, and religious sites. Finally, providing residential space for a large and diverse population is a primary function of any city. While some urban areas may incorporate small-scale farming on the fringe, agricultural production (Statement 5) is the primary characteristic of rural, not urban, areas.

231. (D) GDP per capita
Population data is collected from several primary sources, including the census, which is a complete enumeration, and sample surveys, which gather data from a representative subset. Vital statistics systems provide a continuous record of demographic events like births and deaths. In contrast, GDP per capita is an economic indicator that measures the average economic output per person in a country. While it provides insight into the level of economic development and living standards, it is not a direct source of demographic data like counts of individuals, birth rates, or migration statistics.

232. (A) Resource supply
Thomas Malthus's theory on population primarily focuses on the critical relationship between population growth and the supply of resources, especially food. He argued that while the human population tends to increase at a geometric rate, the means of subsistence can only grow at an arithmetic rate. This inevitable imbalance, he believed, would eventually lead to a point where the population exceeds its resource base, resulting in "Malthusian crises" such as famine, disease, or war. His work highlighted the potential for resource scarcity to act as a fundamental limit to human population growth.

233. (B) The models of Burgess, Hoyt, and Harris & Ullman.
The study of the internal structure of the city focuses on how different land uses and social groups are organized within an urban area. This field of study primarily involves examining the classic models developed by urban geographers and sociologists. These include the Concentric Zone Model (Burgess), the Sector Model (Hoyt), and the Multiple Nuclei Model (Harris and Ullman). These models provide different theoretical frameworks for understanding the spatial organization of cities, emphasizing factors like outward expansion in rings, transportation corridors, and the development of multiple specialized centers of activity.

234. (B) Improvements in public health, sanitation, and food supply.
In Stage 2 of the Demographic Transition Model, also known as the Early Expanding stage, the primary reason for the rapid decline in the death rate is the improvement in living conditions. This includes better nutrition from more stable food supplies and significant advances in public health

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a manifestation of exclusion, as they promote interaction across social classes.

196. (B) Urbanization
Urbanization refers to the process by which a country's population increasingly shifts from rural areas to urban centers, leading to an increase in the number and size of cities. It is often measured as the proportion of the total population living in urban areas. This process is driven by factors such as rural-to-urban migration and high rates of natural increase within cities. Urbanization is a fundamental part of a nation's social and economic development, reflecting the transition from an agrarian society to one focused on industry, services, and advanced information-based economies.

197. (C) High birth rates and high, fluctuating death rates.
Stage 1 of the Demographic Transition Model is characterized by high birth rates and high, fluctuating death rates. In this stage, which applied to most of human history until the Industrial Revolution, population growth is very slow and unstable. Death rates are high due to frequent famines, infectious disease outbreaks, and a lack of medical knowledge, while birth rates remain high to compensate for the high mortality and provide agricultural labor. This results in a stable but vulnerable population at a low overall level of social and economic development.

198. (C) Individual farmhouses are spread out, separated by their fields.
A dispersed or scattered rural settlement pattern is characterized by individual farmhouses that are spread out over a large area rather than being clustered together. Each dwelling is typically located directly on the land that the farmer cultivates, separated from other houses by agricultural fields. This pattern is common in regions where the land is plentiful and where farmers prioritize living close to their work over social clustering or defense. It reflects an extensive farming system and is often found in hilly or rugged terrain where fertile land is not uniformly distributed.

199. (B) The degree to which the data is accurate, complete, and free from errors.
Data reliability in a population census refers to the accuracy and completeness of the information collected. It means that the data is free from significant errors of coverage, such as missing certain groups, or errors of content, such as respondents providing incorrect information. Reliable data is essential for effective government planning, fair resource allocation, and credible social research. Achieving high data reliability requires rigorous training of enumerators, clear survey definitions, and robust quality control and verification procedures throughout the entire process of data collection, transcription, and statistical analysis.

200. (A) Both A and R are true and R is the correct explanation of A.
Urban Social Area Analysis has demonstrated that the residential patterns of cities are not random but follow predictable social rules. People tend to be sorted into different residential areas based on their socioeconomic status, family structure, and ethnic background. This process of residential sorting creates a segregated urban landscape, as groups with similar characteristics cluster in specific neighborhoods. Assertion A is true because these patterns are clearly identifiable, and Reason R provides the correct explanation by identifying the social dimensions that drive this spatial organization and the resulting segregation observed in many cities.

201. (B) Higher wages and job prospects
In migration studies, pull factors are the positive attributes of a destination that attract people to move there. The prospect of higher wages and better job opportunities is one of the most significant pull factors, motivating individuals to move from regions with limited economic prospects to more prosperous areas or cities. These factors attract voluntary migrants who are seeking to improve their quality of life. In contrast, push factors like war, high unemployment, or poor services are negative conditions in the place of origin that compel people to leave and seek a better life elsewhere.

202. (A) High-rent residential areas in shaping the city's growth direction.
The Sector Model of urban growth, proposed by Homer Hoyt, emphasizes the role of high-rent residential areas in determining the overall

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of economic activities that are unregulated and untaxed by the state, contrary to Statement I. Furthermore, Statement II is false because this sector is far from negligible; in many cities of developing countries, it provides a vital source of income and employment for a significant portion of the urban population. People engage in these activities, such as street vending and casual labor, as a survival strategy when the formal economy cannot provide enough regulated and secure jobs.

190. (A) P-3, Q-2, R-1, S-4
Urban theorists have contributed diverse perspectives on city development. Gordon Childe linked urban origins to the "Urban Revolution" following agricultural surplus. Henri Pirenne emphasized the role of long-distance trade and the merchant class in the birth of medieval towns. Lewis Mumford viewed the city as a cultural and social "container." Finally, Ernest Burgess developed the Concentric Zone Model to explain the internal social structure of the industrial city. Understanding these contributions is essential for analyzing the historical and theoretical development of urban systems and their complex spatial organization across different time periods.

191. (C) Allows for a complex and economically rational landscape without a strict hierarchy.
August Lösch's central place model is distinguished from Christaller's by its greater flexibility and economic realism. While Christaller assumed a rigid hierarchy with fixed values, Lösch allowed for market areas to vary in size and overlap based on the specific profit-maximization needs of different firms. His model resulted in a more complex landscape of city-rich and city-poor sectors radiating from a central point. This approach emphasizes that the spatial organization of settlements is driven by economic competition and the diverse spatial requirements of businesses, rather than a predetermined and strict hierarchical order.

192. (D) Depopulation of the urban area.
Rural-urban migration has significant impacts on the destination city, but it does not lead to depopulation. On the contrary, this migration is a primary driver of urban population growth. It increases the demand for housing, infrastructure, and public services, which often leads to the expansion of the city and the growth of informal settlements. It also increases the size of the labor force and contributes to greater cultural diversity within the urban area. Depopulation is a consequence observed in the rural source areas, not in the destination cities themselves.

193. (A) A mixture of urban and rural land uses and rapid transformation.
The rural-urban fringe is a transitional zone on the outskirts of a city where urban and rural land uses are interspersed. This area is characterized by a mix of housing estates, agricultural fields, industrial sites, and recreational spaces. Because of the intense pressure for development and the variety of activities occurring in close proximity, the fringe is often a site of rapid change and land-use conflicts. It represents a dynamic and frequently unplanned landscape that reflects the ongoing process of urban expansion into the surrounding countryside, challenging traditional administrative and spatial boundaries.

194. (B) An anti-natalist policy.
A government program that offers free contraceptives and promotes small family norms is a clear example of an anti-natalist policy. Such policies are designed to slow down population growth by discouraging large families and decreasing fertility rates. They are typically implemented in countries where rapid population expansion outpaces resource availability and economic development. By providing the means for family planning and encouraging social changes in family size preferences, the state aims to achieve a more sustainable population size and improve the overall standard of living and social well-being for all its citizens.

195. (A) 1, 2, 3 and 4
Social exclusion in cities manifests in various ways that separate and marginalize different groups. Gated communities create physical barriers between the wealthy and the poor. Inequality is further seen in the lack of access to quality education and healthcare in disadvantaged neighborhoods. The spatial concentration of ethnic minorities in specific, often deprived, areas is another key indicator. Additionally, unequal policing and the uneven provision of municipal services highlight the systemic nature of exclusion. Well-integrated public spaces, however, represent social inclusion and are not

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growth, and addressing the challenges faced by modern metropolitan areas worldwide.

209. (B) An isotropic plain with uniform population and purchasing power.
A fundamental assumption shared by both Christaller's and Lösch's central place theories is that the settlements are located on an isotropic plain. This is a theoretical, perfectly flat landscape with no physical barriers and a uniform distribution of natural resources. Furthermore, the model assumes that the population is evenly spread across this plain and that everyone has the same purchasing power and tastes. These simplifying assumptions allow theorists to create geometric models of market areas and settlement hierarchies without the complicating effects of topography, unequal wealth, or varying transportation costs.

210. (A) A declining population with a large elderly cohort.
A population pyramid that is wider at the top than at the bottom is characteristic of a declining or shrinking population. This shape indicates that there is a larger proportion of elderly people compared to young children, a trend caused by a sustained period of very low birth rates and high life expectancy. Such a structure, common in several highly developed nations, suggests a potential shortage of labor and increased pressure on social security and healthcare systems. Over time, this demographic imbalance leads to a natural decrease in the total population of the country.

211. (B) Characterized by a mix of rural and urban features and are undergoing rapid change.
Peri-urban areas are transitional zones located on the outer fringes of cities, beyond the established suburbs. These areas are characterized by a dynamic blend of urban and rural features, such as new residential developments interspersed with agricultural land and small industries. They are sites of rapid change and intense land-use competition as the urban area continues to expand into the countryside. Peri-urban zones often face significant challenges, including unplanned growth, inadequate public services, and environmental degradation, reflecting the complexities of the rural-to-urban transition in many rapidly developing regions.

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212. (A) Economic activities that are unregulated and often go unrecorded.
The informal sector comprises a wide range of economic activities that operate outside the official regulatory and taxation framework of the state. These activities are typically small-scale and labor-intensive, such as street vending, casual day labor, and home-based workshops. Because they are not officially recorded, they are often excluded from a country's formal GDP measurements. This sector provides a vital source of income and employment for millions of people, especially in developing nations where the formal economy cannot create enough regulated jobs for the growing urban population and recent migrants.

213. (B) Different activities have different location needs and some are incompatible.
The Multiple Nuclei Model, proposed by Harris and Ullman, suggests that cities grow around several independent nodes because different urban activities have diverse and sometimes conflicting location needs. For example, heavy industry requires proximity to transportation links and large plots of land, but it also repels high-end residential development due to noise and pollution. Conversely, certain businesses benefit from being near each other to share a specialized labor force or services. This natural sorting process, driven by attraction and repulsion, leads to the development of specialized nodes and a polycentric urban structure.

214. (C) Statement I is false, but Statement II is true.
Both statements refer to different sources of population data. Statement I is false because a census is a complete enumeration of the entire population, not a sample survey, which only covers a subset. Statement II is true, as vital statistics systems are designed to provide a continuous and official record of major demographic events, such as births, deaths, and marriages, as they occur over time. These two sources complement each other, with the census providing a periodic snapshot and vital statistics providing ongoing data on population changes and demographic trends.

215. (B) P-2, Q-4, R-1, S-3
Urban problems are diverse and interconnected. Social segregation is the concentration of

direction of a city's expansion. Hoyt argued that these affluent neighborhoods move outward from the city center in wedges along major transportation routes. As these high-rent sectors grow, they attract other services and high-quality residential development, while industrial and low-rent areas expand in different sectors. This model highlights how the choices and movement of the wealthiest residents can significantly shape the spatial organization and long-term land-use patterns of the entire urban area.

203. (B) Mark Jefferson
The term "Primate City" was coined by the geographer Mark Jefferson in 1939. He developed the "law of the primate city" to describe a common pattern in the urban hierarchy where one city is disproportionately larger and more influential than any other city in a country. According to Jefferson, a primate city is not only the most populous but also dominates the nation's political, economic, and cultural life. This concept has been influential in urban studies, particularly in understanding the imbalanced development seen in many developing nations and former colonial territories.

204. (C) A surplus of employment opportunities and rising rural wages.
Rural settlements today face several major contemporary problems, including the large-scale out-migration of young and productive people to urban areas. This leads to depopulation and a lack of labor for agriculture. Additionally, the conversion of agricultural land for industrial and housing purposes creates conflicts over land use and tenure. Rural areas also suffer from a lack of access to modern infrastructure and services compared to cities. However, a surplus of employment and rising wages are not typical problems; rather, rural areas often struggle with unemployment and limited economic opportunities for their residents.

205. (C) 1, 2 and 3 only
The growth of edge cities is driven by the decentralization of urban functions. Factors such as the movement of office and retail space from the central city and increased personal mobility through automobiles have been crucial. The development of major highway interchanges also creates strategic locations for these new economic hubs. Edge cities provide jobs and services in what were once rural or residential areas. Statement 4 is incorrect because edge cities are characterized by a sprawling, auto-dependent structure rather than a preference for dense, traditional urban cores, which they actually represent an alternative to.

206. (C) An internally displaced person (IDP)
An internally displaced person, or IDP, is an individual who has been forced to flee their home due to conflict, persecution, or natural disaster but remains within the borders of their own country. Unlike refugees, who cross international boundaries and are protected by specific international laws, IDPs remain under the jurisdiction of their own government, even if that government is unable or unwilling to protect them. The number of IDPs worldwide is significant, reflecting the impact of internal conflicts and localized environmental crises on the stability and safety of populations within their own nations.

207. (A) Eopolis, arising from a village.
Lewis Mumford, an influential urban theorist, described the development of cities through several stages. He identified the "Eopolis" as the earliest stage of true urban life, arising from a small, simple village. In this phase, the settlement begins to develop more complex social institutions and a permanent urban character, but it still remains closely tied to its rural and agricultural roots. This stage is followed by more advanced forms such as the metropolis. Mumford's model emphasizes the evolutionary nature of urban growth, from its simple origins to its eventual maturity and potential decline into decay.

208. (B) Urban systems and geography.
The study of urban systems and geography focuses on the size, internal structure, and diverse functions of urban areas. This field examines how cities are organized spatially, how they interact with each other in an urban hierarchy, and what roles they play in the social and economic life of a region or nation. It includes analyzing models of urban land use, the processes of urbanization, and the distribution of populations within and between cities. Understanding these elements is essential for effective urban planning, managing

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with limited water resources are typically sparsely populated. This pattern highlights the critical role of physical geography and natural resources in determining where people can live and where large-scale human civilizations can successfully thrive over the long term.

222. (B) Node in the global economic system.
A global city is defined primarily by its strategic function as a major node in the international economic system. These cities serve as primary hubs for global finance, international trade, and corporate decision-making. They host the headquarters of multinational corporations and provide advanced producer services that manage and coordinate global production and information flows. While they are often large, their importance lies in their functional influence and connections across national borders, rather than just their population size, making them essential command and control centers in the new international division of labor.

223. (B) A period of rapid population growth.
Stage 2 of the Demographic Transition Model signifies a period of rapid and often explosive population growth. This occurs because death rates fall sharply due to improvements in nutrition, sanitation, and medical care. However, birth rates remain high because social norms and family practices take longer to change. The large gap between the high birth rate and the falling death rate results in a high rate of natural increase. This stage is typical of developing countries as they begin to modernize, creating significant social and economic challenges for governments and international planners.

224. (B) The inability of infrastructure and services to keep pace with population growth.
One of the most significant challenges of rapid urbanization in developing countries is that population growth often far exceeds the government's ability to provide essential infrastructure and services. This includes inadequate housing, water supply, sanitation, transportation, and healthcare. The result is the proliferation of large informal settlements and slums, where residents live in substandard conditions with limited access to public resources. This gap between the rapid influx of people and the slow development of urban infrastructure creates deep socioeconomic inequalities and persistent challenges for sustainable urban development and management.

225. (A) Both A and R are true and R is the correct explanation of A.
Peri-urban areas are transitional zones located on the outskirts of cities, where urban and rural land uses meet. Assertion A is true because these areas are often the site of intense conflicts over land use. Reason R correctly explains this by identifying the competing demands for land from various sectors, including agriculture, residential development, industry, and infrastructure projects. As the city expands, the pressure for development increases, leading to a dynamic and frequently unplanned landscape where different stakeholders compete for space, making peri-urban zones some of the most contested areas in modern geography.

226. (B) Homer Hoyt
Homer Hoyt was an influential economist who proposed the Sector Model of urban land use in 1939. His model suggested that cities do not grow in simple concentric rings, but rather in a series of sectors or wedges radiating outward from the central business district. Hoyt argued that different types of residential and industrial activities expand along major transportation corridors like rail lines and highways. This model emphasized the role of transportation and the movement of high-rent residential areas in shaping the overall spatial organization and internal structure of the industrial city.

227. (A) Age and sex
The most basic and fundamental distinction in population composition is age and sex. These two characteristics are essential for understanding the demographic structure of a society and its potential for future growth. Sex ratio and age distribution are typically visualized using a population pyramid, which provides immediate insight into birth rates, death rates, and the overall demographic history of a country. These variables also have significant social and economic implications, as they determine the size of the labor force, the dependency ratio, and the specific needs for education, healthcare, and other services.

NODIA

The main premise of the Harris and Ullman Multiple Nuclei Model is that a city's land-use pattern develops around several independent nodes or nuclei, rather than a single central point. These nuclei could include a port, a university, an industrial district, or a specialized commercial center. Each nucleus attracts specific and often mutually supportive activities, while incompatible land uses tend to repel each other. This model recognizes that modern urban areas are complex and polycentric, where various factors and specialized location needs shape the overall city layout and internal structure.

242. (C) Sedentary
Migration involves the movement of people from one place to another. Common types include internal migration within a country, international migration across borders, and forced migration due to conflict or disaster. Voluntary migration is driven by personal choices like job seeking. In contrast, being sedentary means staying in one place and not moving or migrating. Sedentary lifestyles and settlements are the opposite of migration and nomadic movement. Therefore, sedentary behavior is a state of stability or fixed residence rather than a type of human movement or migration across geographical space.

243. (B) A dynamic and often chaotic mix of land uses.
Changing urban forms like peri-urban areas and rural-urban fringes are characterized by their dynamic and transitional nature. These zones are located on the outskirts of cities, where urban and rural land uses are interspersed. They often feature a mix of residential developments, agricultural fields, small-scale industries, and recreational spaces. Because the transformation is rapid and often unplanned, these areas frequently exhibit a chaotic landscape with significant land-use conflicts and environmental challenges. They reflect the complexities of the ongoing process of urban expansion and the blurring of traditional urban and rural boundaries.

244. (B) Underestimating human ingenuity and technological advances.
Malthus's theory on population growth has been criticized primarily because he failed to anticipate the role of human ingenuity and technological progress. He believed that the food supply would only increase arithmetically, but he underestimated how advancements in agricultural science, machinery, and fertilizers could vastly increase yields. Furthermore, he did not foresee how social changes and modern contraception would lead to lower birth rates as societies modernized. These factors have allowed the world's population to grow much larger than Malthus predicted without the catastrophic food shortages and checks he considered inevitable.

245. (B) Stage 2
A country experiencing a high birth rate and a rapidly falling death rate is in Stage 2 of the Demographic Transition Model, also known as the Early Expanding stage. In this phase, population growth is exceptionally rapid because improvements in nutrition, sanitation, and medical care lead to a sharp decline in mortality. However, birth rates remain high because social and cultural changes take longer to occur. This results in a massive gap between births and deaths, creating a high rate of natural increase and leading to an explosive expansion of the total population size.

246. (B) The predominant economic activities of the population.
The fundamental difference between a rural and an urban settlement is the primary economic activity of its residents. Rural settlements are typically small and are characterized by a population that is predominantly engaged in primary sector activities, such as agriculture, forestry, or fishing. In contrast, urban settlements are larger and their residents are mainly involved in secondary (manufacturing), tertiary (services), and quaternary (information and management) activities. While population size is also a factor, it is the nature of the economic work and the complexity of the functions that define these two types of settlements.

247. (B) The set of interdependent cities and towns within a region or country.
An urban system refers to the complex network of interconnected and interdependent cities and towns within a specific region or a whole country. These settlements are linked through the movement of people, goods, information, and services. The study of an urban system examines the hierarchy of cities, their relative sizes, and the specialized functions each city performs.

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and sanitation, such as clean water and waste management. These changes, often combined with basic medical improvements like vaccines and antibiotics, significantly reduce the incidence of infectious diseases and infant mortality. Consequently, life expectancy increases, leading to a period of rapid and explosive population growth.

235. (B) Population size
The concept of a megacity is based on a specific threshold of population size. According to the United Nations, a megacity is an urban agglomeration with a total population of ten million or more inhabitants. This definition focuses solely on the number of people living in a continuous urban area, rather than its geographical size or its functional role in the global economy. As global urbanization continues, the number of megacities has increased dramatically, particularly in Asia and Africa, creating massive urban centers with unique and complex social, economic, and infrastructural challenges.

236. (B) More planned and has a distinct economic base.
A satellite town differs from a suburb in its level of independence and planning. While a suburb is primarily a residential community on the outskirts of a city with many residents commuting for work, a satellite town is a more self-contained urban settlement. It is typically a planned town with its own economic base, providing local employment and services. While it remains functionally linked to the nearby major metropolis through transportation, it is designed to be more independent and less reliant on the central city for day-to-day social and economic needs.

237. (A) Urban system
The rank-size rule is a concept used to describe the statistical hierarchy within an entire urban system, which is the set of interdependent cities and towns in a country or region. It suggests a relationship between the population size and the rank of cities, indicating a balanced distribution where there are many cities of various sizes. This pattern is often contrasted with a primate city hierarchy, where one city is disproportionately large. The rank-size rule provides a way to quantify and analyze the overall structure and integration of a nation's settlement pattern.

238. (C) Statement I is false, but Statement II is true.
Social segregation in cities is a complex phenomenon driven by several factors. Statement I is false because segregation is not solely economic; it is also heavily influenced by racial, ethnic, and social factors. Statement II is true, as Urban Social Area Analysis is a common geographical method used to identify and map these residential patterns. It examines the distribution of populations based on their socioeconomic status, family structure, and ethnic background, helping researchers understand the diverse social geography of cities and the processes that lead to residential concentration and segregation.

239. (C) The Industrial Revolution
The most significant driver of urbanization in developed countries during the nineteenth and early twentieth centuries was the Industrial Revolution. This period of rapid technological change transformed agrarian economies into industrial ones, creating a massive demand for factory labor in cities. At the same time, improvements in agricultural productivity reduced the need for workers on farms. These push and pull factors led to a large-scale migration from the countryside to urban centers, resulting in the rapid growth of industrial cities and the overall urbanization of Western societies during this era.

240. (A) P-2, Q-4, R-1, S-3
Modern urban geography uses specific terms for different city forms. A megacity is defined by having a population over ten million. A global city is identified as a command center in the world economy through finance and trade. An edge city is a node of economic activity located on the outskirts of a larger metropolis, often near highways. Finally, a satellite town is a planned, self-contained community near a major city with its own distinct identity. Understanding these key features is essential for analyzing the complex and diverse forms of modern urban development worldwide.

241. (C) A city's layout is centered around several distinct nodes.

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different social groups in specific neighborhoods. The informal sector refers to the proliferation of unregulated small businesses and street vending. Land use changes involve the conversion of agricultural land on the urban fringe for housing or industry. Finally, rural-urban migration is the movement of people from the countryside to cities in search of better opportunities. Understanding these issues is essential for urban planners and social geographers as they address the challenges and complexities of rapid urban growth and societal transformation.

216. (B) The expansion of the city, or urban sprawl.
A primary cause of change in land use on the edges of urban areas is the physical expansion of the city itself, often referred to as urban sprawl. As cities grow in population, the demand for new housing, commercial space, and industrial sites increases, leading to the conversion of surrounding agricultural land and natural habitats into urbanized landscapes. This outward expansion is driven by factors such as population growth, improved transportation, and the desire for more living space. Urban sprawl creates a dynamic and often unplanned transitional zone with significant social and environmental impacts.

217. (A) The level of economic development.
Occupational structure is a key indicator of a nation's level of economic development. It refers to how the workforce is distributed across primary (agriculture), secondary (industry), and tertiary (services) sectors. In less developed economies, a high proportion of the population is usually engaged in the primary sector. As a country develops and modernizes, the workforce shifts toward manufacturing and then predominantly toward service and information-based occupations. Analyzing these proportions helps geographers and economists understand the economic maturity and industrial structure of a country and its position in the global economy.

218. (B) Gordon Childe
Gordon Childe was a prominent archaeologist who linked the origin of the first cities to the agricultural surplus generated during the "Neolithic Revolution." He argued that the transition from nomadic lifestyles to settled farming allowed for the production of extra food, which could then support a specialized population of non-farmers, such as artisans, priests, and administrators. This process, which he termed the "Urban Revolution," led to the development of centralized urban settlements with complex social structures, organized governance, and the invention of writing, transforming the fundamental nature of human society and civilization.

219. (D) The expansion of high-quality public infrastructure in all neighborhoods.
Poverty in the city manifests through various social and spatial indicators, including the growth of slums, high crime rates, and the expansion of the informal economy. These phenomena occur when urban growth outpaces the formal economy and infrastructure. However, the expansion of high-quality public infrastructure across all neighborhoods is a sign of equitable development and investment, rather than a manifestation of poverty. In reality, impoverished areas often suffer from a severe lack of basic services and infrastructure, reflecting the spatial inequalities and social exclusion that characterize many rapidly urbanizing metropolitan areas.

220. (B) Rank-Size Rule
The rank-size rule describes a specific urban hierarchy where the population of a city is inversely proportional to its rank. In this example, the second-largest city has half the population of the largest, and the third-largest has approximately one-third. This follows the mathematical relationship proposed by the rule, indicating a well-integrated and balanced urban system with many cities of varying sizes. This pattern is often found in large, developed countries with decentralized economies and long histories of urban development, contrasting with systems dominated by a single, disproportionately large primate city.

221. (A) The availability of freshwater.
The availability of freshwater is a fundamental determinant of world population patterns. Humans require water for drinking, sanitation, and especially for agriculture, which supports large populations. Consequently, the world's most densely populated areas are concentrated along major river valleys and in coastal regions with reliable rainfall. Conversely, arid regions

It also analyzes the relationships and spatial organization among these urban centers, such as how larger cities provide high-order services to smaller ones. Understanding the urban system is essential for regional development and national planning.

248. (B) 3, 2, 1
Large urban agglomerations have been recognized and defined over time. A "Metropolis" (3) is the traditional term for a large city and its surrounding urban area. As urban centers grew even larger, the term "Megacity" (2) emerged to describe those with populations over ten million. Finally, the "Global City" (1) is a more modern concept, recognized since the late twentieth century to identify cities based on their strategic functional role in the international economic system. Therefore, the general chronological sequence of these terms in urban geography and sociology is metropolis, megacity, then global city.

249. (B) A brain drain due to rural-urban migration.
Contemporary problems in rural settlements often include a significant "brain drain" caused by rural-to-urban migration. This occurs when the most educated, young, and productive members of the rural community move to cities in search of better career opportunities and services. This out-migration leaves behind an aging population and a shortage of skilled labor, which can hinder local development and the sustainability of rural life. While cities offer diverse prospects, this loss of human capital is a major challenge for the economic and social vitality of many rural areas in both developing and developed nations.

250. (A) Ernest Burgess
Ernest Burgess proposed the Concentric Zone Model in the early twentieth century to explain the internal social structure of cities. His model suggests that urban land use develops in a series of rings radiating outward from a central business district. Each zone represents a different type of residential or economic activity, reflecting a transition from the core to the periphery based on socioeconomic status and access to transportation. The model highlights how competition for land and the expansion of the central city drive the spatial organization of the modern industrial urban environment.

251. (B) Its high cost and infrequent, periodic nature
A national census involves a complete enumeration of a country's entire population at a specific time, providing comprehensive demographic data. Its primary drawbacks are the significant financial resources required for implementation and its periodic nature, typically occurring only once every decade. These factors limit the frequency and timeliness of data available for detailed, continuous demographic monitoring and analysis.

252. (A) They offer more timely and detailed information on specific topics
Sample surveys provide more detailed and timely information by focusing on a representative subset of the population. Unlike a comprehensive census, these surveys are more flexible and faster to conduct, allowing for regular updates on specific demographic issues. This efficiency bridges information gaps between decennial counts, though results remain subject to potential sampling errors during data collection processes.

253. (C) The issue of under-registration and data inaccuracy
Vital statistics systems in many developing nations encounter significant difficulties regarding the reliability of their data. The primary challenges involve widespread under-registration of vital events like births and deaths, alongside general data inaccuracy. Such issues hinder the effective calculation of fertility and mortality rates, which are essential for understanding population dynamics and formulating informed social and economic policies.

254. (D) Data reliability
Coverage errors and content errors are critical factors that directly influence the reliability of demographic data. Coverage errors occur through over-counting or under-counting individuals, while content errors involve recording inaccurate information during data collection. Both types of errors compromise the overall validity of demographic analysis, making it essential for geographers to remain vigilant when assessing population-related data sources.

255. (C) To continuously record key demographic events like births and deaths

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Urbanization in developing nations is frequently driven by a combination of rural push factors and perceived urban opportunities. Conditions like poverty, landlessness, and lack of jobs in rural areas compel people to leave. At the same time, the prospect of better employment, amenities, and freedom in cities attracts them, even if these opportunities are not always available to migrants.

290. (A) Speed of population shift and the capacity to manage it
The passage highlights that the fundamental difference in urbanization between developed and developing nations lies in the speed of the process and the capacity to manage it. In developed countries, the process was gradual and tied to economic growth. In developing countries, it is rapid and often outpaces the development of infrastructure, formal jobs, and necessary governance.

291. (C) A system demonstrating the law of the primate city
A system where the largest city is disproportionately bigger than others, such as being more than twice the size of the second-largest, demonstrates the law of the primate city. This pattern suggests an unbalanced urban hierarchy, often found in countries with centralized power or a colonial history. In such cases, the primate city dominates the nation's economic and social life.

292. (A) The spatial distribution of settlements is based on providing goods and services
Walter Christaller's Central Place Theory focuses on the spatial distribution of settlements based on their role in providing goods and services to the surrounding population. He proposed that cities and towns form a hierarchical system where the size and spacing of settlements are determined by the range and threshold of the services they offer to consumers in regional markets.

293. (D) Lösch created a less rigid and more complex model allowing for specialization
August Lösch modified Christaller's rigid model of central places to create a more complex and realistic economic landscape. His theory allowed for specialized production centers rather than just a fixed hierarchy of services. By introducing more variability, Lösch's model accounts for the diverse ways that different cities can develop based on their specific economic functions, trade patterns, and specializations.

294. (B) One-fourth that of the largest city
According to the rank-size rule, the population of any city in a well-integrated system is approximately equal to the population of the largest city divided by its rank. Therefore, the fourth-largest city would have a population that is roughly one-fourth of the largest city's population. This rule reflects a balanced hierarchy where urban centers of various sizes are distributed predictably.

295. (C) Hexagon
Walter Christaller utilized a model of nested hexagons to represent the market areas of central places. The hexagon was chosen because it allows for an efficient division of space without gaps or overlaps, which occurs with circles. This geometric shape helps explain how different settlements are spatially distributed and how they provide services to their respective hinterlands within a hierarchy.

296. (D) The Sector Model by Hoyt
The Sector Model, developed by Homer Hoyt, describes urban land use as growing outward from the center in wedge-shaped patterns. These sectors often follow major transportation routes, such as railways or main roads. This model suggests that different functional areas, like high-rent housing or industrial zones, expand along these corridors, influencing the overall direction and shape of city growth.

297. (A) Harris and Ullman's Multiple Nuclei Model
The Multiple Nuclei Model, proposed by Harris and Ullman, suggests that large cities develop around several distinct centers rather than just one central business district. These nuclei may be specialized areas for industry, retail, or education. This model reflects the complexity of modern urban growth, where different activities cluster in various locations, creating a decentralized and multifaceted internal city structure.

298. (B) Edge cities and peri-urban areas
Modern city growth has led to the emergence of changing urban forms such as edge cities and peri-urban areas. Edge cities are suburban

drives wages back down to the subsistence level. This cycle creates a trap where the working population remains at a basic survival standard.

264. (D) Increase the death rate, such as famine and disease
Positive checks in Malthusian theory refer to natural or social events that increase the death rate within a population. These include factors such as famine, disease, war, and natural disasters. Such events act as involuntary mechanisms to reduce the total number of people when the population exceeds the available food supply, restoring a temporary balance between resources and humans.

265. (A) David Ricardo
David Ricardo is the classical economist associated with the theory that population growth increases the labor supply, which subsequently depresses wages. He posited that any temporary increase in wealth for workers leads to higher fertility, eventually returning wages to the minimum level required for survival. This perspective highlights the complex historical relationship between demographic shifts and classical economic principles.

266. (B) Widespread unemployment in a person's home region
Push factors represent negative conditions in an individual's home region that compel them to move elsewhere. Examples include widespread unemployment, political conflict, poverty, or environmental degradation. These factors make staying in the place of origin difficult or undesirable. Understanding these drivers is essential for analyzing the motivations behind migration and for predicting movement patterns between different geographical regions and countries.

267. (B) The loss of skilled and educated individuals ('brain drain')
Migration can lead to significant negative consequences for the region that people leave behind. One major issue is the loss of skilled, educated, and young individuals, commonly known as a brain drain. This movement creates a demographic imbalance and depletes the human capital necessary for local economic development and innovation, potentially hindering the long-term growth and stability of the area.

268. (A) The majority of migratory movements cover short distances
Ravenstein's Laws of Migration provide fundamental insights into the nature of human movement. One key observation is that the majority of migrants travel only short distances. These movements often occur toward nearby centers of commerce and industry. While long-distance migration exists, it is less common and typically involves movement toward major industrial or commercial hubs that offer significant pull factors.

269. (C) The inflow of financial remittances from migrants
One potential positive consequence of migration for the area of origin is the inflow of financial remittances. Migrants often send money back to their families, which can boost the local economy and improve living standards. These funds provide essential capital for investment, education, and healthcare, partially offsetting the negative impacts of losing productive members of the local workforce and community.

270. (D) The spatial scale of the movement
The classification of migration into internal or international categories is determined by the spatial scale of the movement. Internal migration occurs within the borders of a single country, such as moving between provinces. International migration involves crossing national boundaries to settle in a different country. This distinction is vital for understanding legal frameworks, administrative challenges, and various socio-economic impacts.

271. (C) A young population with high fertility and potential for rapid growth
A population pyramid with a broad base and a narrow top indicates a young population with high fertility rates. This shape reflects a history of high birth rates and suggests significant potential for future growth. Such structures are typical of many developing countries where the younger age cohorts represent the largest segment of the total population, impacting social and economic planning.

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A vital statistics registration system serves the essential function of continuously recording major life events within a population. These events include births, deaths, marriages, and divorces, which are critical for calculating vital rates. Unlike the periodic census, this system provides ongoing data tracking, though its reliability varies globally based on the administrative capacity and accuracy of registration practices.

256. (B) The second stage, with declining mortality and high fertility
The second stage of the demographic transition model is characterized by rapid population growth. This explosion occurs because mortality rates decline sharply due to improvements in public health, sanitation, and food security. Simultaneously, birth rates remain high because social norms and reproductive behaviors adjust more slowly to changing conditions. This imbalance between falling deaths and high births drives growth.

257. (D) Improvements in public health, sanitation, and food supply
Mortality rates begin to fall at the start of the demographic transition primarily because of advancements in public health and infrastructure. Improved sanitation, better food supply, and enhanced medical care significantly reduce death rates. These developments allow individuals to live longer and decrease the incidence of infectious diseases, marking a shift from the high-death-rate equilibrium seen in pre-industrial societies.

258. (A) Stage three, due to a fall in birth rates
During the third stage of the demographic transition, the rate of population growth begins to decelerate significantly. This slowdown is primarily driven by a fall in birth rates, influenced by increasing urbanization, improved access to education, especially for women, and the wider availability of contraception. As social and economic conditions evolve, families typically transition toward having fewer children.

259. (C) Developed countries that have completed the transition
The demographic transition model is a framework developed primarily from the historical demographic experiences of developed countries. It tracks their shift from pre-industrial stages with high vital rates to post-industrial stages with low rates. While it provides a useful generalization for understanding population change, its universal applicability to developing nations is debated due to differing socio-economic and contemporary conditions.

260. (A) Increased urbanization and education
Several social and economic factors contribute to the decline of birth rates during the third stage of demographic transition. Increased urbanization and expanded educational opportunities, particularly for women, play major roles in changing reproductive behaviors. Additionally, better access to contraception and shifting societal norms regarding family size lead to lower fertility levels, causing the overall population growth rate to slow.

261. (D) Population increases geometrically while food supply increases arithmetically
The Malthusian theory suggests that human population grows at a geometric rate, doubling over regular intervals if left unchecked. In contrast, the means of subsistence, such as food supply, only increases at an arithmetic rate. This fundamental disparity leads to a resource gap, eventually resulting in a catastrophe unless the population is controlled through preventive or positive demographic checks.

262. (B) Sadler proposed that fecundity decreases as population density and prosperity increase
Michael Thomas Sadler proposed a theory that differs from Malthusian ideas by emphasizing a natural regulatory mechanism for population growth. He argued that human fecundity naturally decreases as population density and prosperity increase. In this view, higher density and economic well-being act as built-in brakes on population expansion, contrasting with the more pessimistic Malthusian outlook on inevitable resource depletion.

263. (C) An encouragement for workers to have more children, increasing population
David Ricardo argued that if wages rise above the subsistence level, it encourages workers to have more children. This demographic response leads to an increased labor supply in the long term. Consequently, the surplus of workers eventually

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farmland that supports the community, reflecting a social and economic organization where people live in proximity to one another for mutual benefit.

281. (A) Gordon Childe
Gordon Childe's theory of the urban revolution links the origin of towns to technological advancements like the invention of the plow and metallurgy. These innovations led to an agricultural surplus, which allowed some people to specialize in non-farming roles. Consequently, craftsmen, priests, and administrators gathered in early urban centers, marking a fundamental shift in human social and economic organization.

282. (B) The revival of long-distance trade
Henri Pirenne's theory emphasizes that the revival of long-distance trade was the primary catalyst for the development of medieval towns. He argued that these towns grew as fortified marketplaces and commercial centers for merchants. This resurgence of trade broke the self-sufficient nature of the feudal agrarian economy, linking urbanization directly to the expansion of commerce and merchant classes.

283. (B) To act as a cultural container for religious and social congregation
Lewis Mumford proposed that the earliest urban forms served primarily as ceremonial centers for religious and social purposes. He viewed the city as a cultural container rather than just an economic entity. According to this perspective, the city's fundamental role was to facilitate human congregation, enhance cultural interaction, and ensure the transmission of social values across generations.

284. (A) Medieval Europe
The Pirenne Thesis is most closely associated with the emergence and growth of towns in medieval Europe. Henri Pirenne argued that the decline and subsequent revival of maritime trade were central to the urban history of this period. His work highlights how commerce transformed the socio-economic landscape, leading to the establishment of towns as vital centers of trade activity.

285. (C) Childe focused on economic factors while Mumford highlighted socio-cultural aspects
A key difference between the theories of Gordon Childe and Lewis Mumford lies in their primary focus. Childe emphasized economic and technological factors, such as agricultural surplus and specialized labor, as the drivers of urbanization. In contrast, Mumford highlighted the socio-cultural and ceremonial roles of cities, viewing them as containers for human interaction, religious activities, and cultural preservation.

286. (D) It was a gradual process linked to industrialization
Urbanization in developed countries was a gradual process that spanned a long historical period. It was closely tied to the industrial revolution, allowing for the steady development of infrastructure and governance alongside population shifts. This synchronized growth meant that cities could often manage the transition more effectively than in regions where urban growth occurred rapidly without corresponding economic and industrial expansion.

287. (C) Characterized by population growth that outpaces formal job creation
Urbanization in many developing countries is characterized by a situation where population growth in cities outpaces the creation of formal industrial jobs. This phenomenon, often termed urbanization without industrialization, leads to significant challenges. Cities frequently lack the economic capacity to provide formal employment, resulting in large informal sectors and strained public services as the urban population increases rapidly and unexpectedly.

288. (B) The proliferation of megacities and overburdened infrastructure
Rapid urbanization in the developing world is often associated with the proliferation of megacities and the significant overburdening of existing infrastructure. These massive urban areas face immense challenges in providing basic services like water, sanitation, and housing to their rapidly growing populations. This trend reflects the intense pressure on urban systems when population growth occurs faster than facilities expand.

289. (D) A combination of rural push factors and perceived urban opportunities

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272. (B) Occupational structure, particularly the shift between sectors
Occupational structure serves as a key indicator of a society's economic maturity and development level. It categorizes the workforce into primary, secondary, and tertiary sectors. A shift in the labor force from agricultural activities toward manufacturing and service-oriented sectors signifies economic transformation. This structural change reflects the increasing complexity and productivity of an economy as it evolves over time.

273. (D) A process of economic transformation and development
When a workforce transitions from the primary sector to the tertiary sector, it signifies a profound process of economic development and transformation. The primary sector focuses on the extraction of raw materials, while the tertiary sector involves services. This shift generally indicates higher levels of industrialization, urbanization, and economic maturity, as the economy moves away from subsistence activities.

274. (A) Educational levels
Educational levels are a fundamental component of population composition and serve as a vital measure of human capital. High levels of education directly influence economic productivity, foster social mobility, and affect demographic behaviors such as fertility rates. Investing in education enhances the skills of the workforce, which is essential for sustainable economic growth and social advancement of a society.

275. (C) A higher level of industrialization and economic development
A high proportion of urban population typically correlates with advanced levels of industrialization and economic development within a country. As economies move away from agriculture toward manufacturing and services, people increasingly concentrate in urban centers to access jobs and better infrastructure. This urbanization process reflects the structural changes in the economy and the growing importance of industrial and service activities.

276. (A) Dispersed settlements
Dispersed settlements are characterized by isolated farmsteads that are spread across a wide geographic area. This type of settlement is frequently found in regions where extensive agriculture is practiced and land is plentiful. In such environments, individual dwellings are situated far apart from one another, contrasting with more clustered or nucleated forms where houses are built close together.

277. (D) A linear pattern
A linear settlement pattern occurs when houses and other structures are built in a line along a transportation route, such as a road, railway, or river. This arrangement is often driven by the need for accessibility to transport or water resources. The physical layout follows the path of the specific feature, creating an elongated and narrow distribution of human habitation.

278. (B) The drainage of the young population due to rural-urban migration
Persistent rural-urban migration is a major contemporary problem affecting rural settlements. This trend results in the loss of the younger and more dynamic segments of the village population, who move to cities seeking better opportunities. Consequently, rural areas face labor shortages and demographic imbalances, which can weaken the traditional socio-economic vitality and long-term sustainability of many village communities.

279. (C) Conflicts and displacement of the local population
Land acquisition for industrial and infrastructure projects in rural areas often leads to significant social disruptions. These processes frequently result in conflicts between local communities and authorities, as well as the displacement of the resident population. Such changes disturb the traditional socio-economic fabric of the region and can threaten the viability of traditional livelihoods and established rural lifestyles.

280. (D) Houses clustered closely together in a central location
Compact or nucleated settlements are defined by houses that are clustered closely together in a central location. This arrangement often promotes strong community cohesion and provides better defense for the residents. These settlements are frequently surrounded by the

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concentrations of business, shopping, and entertainment that function as secondary urban centers. Peri-urban areas and the rural-urban fringe represent the transitional zones where urban and rural land uses meet, reflecting the expanding and increasingly complex nature of regions.

299. (B) The patterns of social segregation
Urban Social Area Analysis is a method used by geographers to study patterns of social segregation within cities. This analysis identifies how different social, economic, and ethnic groups are distributed across the urban landscape. It often reveals deep inequalities, such as concentrated poverty, the existence of slums, and social exclusion, reflecting the socio-economic divisions inherent in internal city structures.

300. (A) Nested rings radiating from a central core
The Concentric Zone Model, proposed by Ernest Burgess, envisions the internal structure of a city as a series of five nested rings radiating from a central core. The innermost ring is the Central Business District, followed by transitional, residential, and commuter zones. This model provides a framework for understanding how land uses and social groups are organized spatially within cities.

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CHAPTER 06

Geography of Economic Activities and Regional Development

1. Which of the following best defines a primary economic activity?
(A) The systematic processing of raw materials into finished manufactured goods.
(B) The direct extraction or harvesting of natural resources from the earth.
(C) The provision of various services to business entities and individual consumers.
(D) The collection, processing, and strategic manipulation of digital information.

2. What type of economic activity is represented by the manufacturing of steel from iron ore?
(A) Secondary
(B) Primary
(C) Tertiary
(D) Quaternary

3. Identify the activity that falls under the tertiary sector.
(A) Fishing
(B) Software development
(C) Retail trade
(D) Coal mining

4. A university professor engaged in advanced research is primarily part of which economic sector?
(A) Primary
(B) Secondary
(C) Tertiary
(D) Quaternary

5. Match List I with List II.
List I: (Resource Classification by Origin)
P. Biotic Resource
Q. Abiotic Resource
R. Man-made Resource
S. Ubiquitous Resource
List II: (Example)
1. Iron Ore
2. Sunlight
3. Fisheries
4. Technology
(A) P-3, Q-1, R-4, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-2, Q-3, R-1, S-4

6. Which of the following is NOT a primary factor affecting the spatial organisation of economic activities?
(A) Access to raw materials
(B) National language
(C) Availability of capital
(D) Government policy

7. Considering the classification of natural resources, which of the following is considered a non-renewable resource?
(A) Solar energy
(B) Forests
(C) Wind energy
(D) Petroleum

8. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The World Energy Crisis disproportionately affects developing countries.
Reason (R) : Developing countries often lack the capital and technology to exploit their own energy resources and are heavily dependent on imported fossil fuels.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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9. The concept of 'resource management' primarily involves which of the following?
(A) The unrestricted and rapid exploitation of all available natural resources.
(B) The total preservation of resources by completely halting their human use.
(C) The efficient and sustainable use of resources for long-term benefit.
(D) The exclusive and prioritized allocation of resources to developed nations.

10. A major problem associated with the global distribution of petroleum reserves is their:
(A) concentration in a few politically sensitive regions.
(B) even distribution across all geographic continents.
(C) rapid rate of natural renewal and replenishment.
(D) primarily biotic origin which makes them unpredictable.

11. Consider the following statements regarding quaternary economic activities:
1. They are often referred to as 'gold collar' professions.
2. They involve high-level decision making and policy formulation.
3. They are primarily concerned with the extraction of raw materials.
4. They are centered around knowledge, information, and research.

Which of the above statement(s) is/are correct?
(A) 1 and 3 only
(B) 2 and 3 only
(C) 1, 2, and 4 only
(D) 3 and 4 only

12. Which statement best reflects a problem associated with the management of common property resources like international fisheries?
(A) The ease of enforcing international maritime regulations.
(B) The tragedy of the commons, leading to overexploitation.
(C) The total lack of economic value in such natural resources.
(D) The abundance of resources exceeding harvesting capacity.

13. The shift of a country's workforce from agriculture to manufacturing and then to services is a key indicator of:
(A) environmental degradation.
(B) political instability.
(C) economic development.
(D) population decline.

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14. Given below are two statements:
Statement I : The primary sector is more dominant in the economies of developed countries than in developing countries.
Statement II : Tertiary and quaternary activities form the backbone of the economy in most highly developed nations.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

15. What is the fundamental basis of Land Capability Classification?
(A) The inherent physical characteristics and limitations of the land for agricultural use.
(B) The political boundaries and administrative divisions of a specific region.
(C) The historical cropping patterns and traditional farming of a local area.
(D) The relative proximity of the agricultural land to major urban centers.

16. Consider the following statements regarding the World Energy Crisis:
1. It is solely a problem of physical scarcity of energy resources.
2. Political instability in major oil-producing regions is a significant contributing factor.
3. Developed countries are immune to the effects of the energy crisis due to their advanced technology.
4. The crisis highlights the need for a transition towards renewable energy sources.
5. Price volatility in the global energy market is a major characteristic of the crisis.

Which of the above statement(s) is/are correct?
(A) 1, 3 and 5
(B) 2, 4 and 5
(C) 1, 2 and 3
(D) 3, 4 and 5

17. Which geographer's method for delineating crop combination regions is based on the standard deviation of the differences between the actual crop percentages and a theoretical standard?
(A) K. Doi
(B) J.C. Weaver
(C) S.M. Rafiullah
(D) Von Thunen

18. What is the primary objective of Land Use Planning?
(A) To allocate land uses among various competing claims in a systematic and rational manner.
(B) To maximize short-term agricultural profits without considering any environmental impact.
(C) To convert all available rural land into permanent urban settlements and infrastructure.
(D) To enforce a single crop system across an entire region for administrative simplicity.

19. In the context of agricultural geography, crop diversification refers to:
(A) growing only one type of crop over a large area.
(B) replacing food crops with commercial crops exclusively.
(C) the practice of increasing the variety of crops grown on a farm or in a region.
(D) the use of genetically modified crops only.

20. According to Von Thunen's Model, which activity would be located closest to the central market?
(A) Extensive cattle ranching
(B) Forestry and firewood production
(C) Grain farming
(D) Intensive dairying and market gardening

21. Arrange the following agricultural methods/ concepts in the chronological order of their proposition:
1. Von Thunen's Model of Agricultural Land Use
2. Weaver's Crop Combination Method
3. Green Revolution in India
4. Land Capability Classification by the USDA
(A) 4, 1, 3, 2
(B) 1, 2, 4, 3
(C) 1, 4, 2, 3
(D) 2, 1, 4, 3

22. The formula $\Sigma(d)^2$ where 'd' is the difference between the observed and theoretical percentage of crop coverage, is central to which scholar's crop combination method?
(A) Weaver
(B) Doi
(C) Rafiullah
(D) Spencer

23. Which of the following is a key determinant of agricultural productivity?
(A) The number of public holidays in a country.
(B) The relative distance of a farm from the equator.
(C) The aesthetic color of the surface soil only.
(D) The level of technological inputs like irrigation and fertilizers.

24. A region experiencing significant variations in agricultural productivity is most likely characterized by:
(A) disparities in land tenure systems and access to irrigation.
(B) uniform climatic conditions and homogenous soil properties.
(C) equal access to capital and technology for all resident farmers.
(D) a centrally planned and homogenous national agricultural policy.

25. Match List I with List II.
List I: (Agricultural System)
P. Shifting Cultivation
Q. Extensive Commercial Grain Farming
R. Mediterranean Agriculture
S. Plantation Agriculture
List II: (Characteristic Feature)
1. Large-scale monoculture of cash crops like tea or rubber
2. Cultivation of citrus fruits, olives, and grapes
3. Highly mechanized, low labor input per unit area
4. Slash-and-burn technique in tropical forest areas
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-2, S-1
(C) P-4, Q-1, R-2, S-3

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(D) P-2, Q-3, R-4, S-1

26. S.M. Rafiullah modified Weaver's method for delineating crop combination regions by using:
(A) the maximum positive deviation.
(B) the standard deviation.
(C) the Gini coefficient.
(D) the location quotient.

27. Which of the following is NOT a benefit of crop diversification?
(A) Improved soil health and fertility.
(B) Enhanced food and nutritional security.
(C) Increased and more stable farm income.
(D) Increased risk of total crop failure due to pests or disease.

28. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : In Von Thunen's model, the intensity of cultivation decreases with increasing distance from the market.
Reason (R) : Transport costs per unit of product increase with distance from the market, making less intensive land uses more profitable further away.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

29. An incorrect statement regarding the measurement of agricultural productivity is:
(A) It can be measured as output per unit of land.
(B) It can be measured as output per unit of labor.
(C) It is solely determined by the amount of rainfall received.
(D) It is influenced by the quality of seeds and fertilizers used.

30. The "Agricultural Systems of the World" are differentiated primarily based on:
(A) the prevailing political ideology of the nation state.
(B) the predominant language spoken by local farmers.
(C) the specific continent on which they are practiced.
(D) the combination of crops, livestock, technology, and socio-economic factors.

31. Consider the following statements about Land Capability Classification:
1. It is a system of grouping soils primarily on the basis of their potentialities and limitations for agricultural use.
2. Class I lands have few limitations that restrict their use.
3. Class VIII lands are unsuitable for any commercial plant production.
4. The classification disregards factors like climate and soil slope.

Which of the above statement(s) is/are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 2, 3 and 4 only

32. What is a "footloose industry"?
(A) An industry heavily dependent on a specific localized raw material source.
(B) An industry that can be located at any site without being affected by transport costs or resources.
(C) An industry primarily dedicated to the large-scale manufacturing of specialized footwear.
(D) An industry characterized by high emissions that significantly pollute the local environment.

33. Which of the following is an example of a basic industry?
(A) A local bakery
(B) A steel plant whose products are sold nationwide
(C) A neighborhood convenience store
(D) A dry-cleaning service

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34. According to Alfred Weber's theory of industrial location, the primary determining factors are:
(A) transport costs, labor costs, and agglomeration economies.
(B) political stability, climate, and culture.
(C) historical precedent and personal preference of the entrepreneur.
(D) proximity to universities and research

institutions.

35. The concept of the 'Isodapane' in Weber's theory represents a line of equal:
(A) labor cost.
(B) raw material cost.
(C) total transport cost.
(D) agglomeration benefits.

36. Consider the following statements regarding the key assumptions in August Losch's theory of industrial location:
1. An isotropic plain with uniform resources and transport routes.
2. A large population of farmers with homogenous tastes.
3. A focus on maximizing profit for the producer.
4. A fixed, single location for the market.
5. The state completely controls all industrial location decisions.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 2, 4, and 5
(C) 1, 2, and 3
(D) 3, 4, and 5

37. D.M. Smith's theory of industrial location introduced the concept of:
(A) the material index.
(B) the profit-maximization space.
(C) the 'spatial margins to profitability'.
(D) the growth pole.

38. Which industrial region is famously known as the 'Ruhr Valley'?
(A) The American Manufacturing Belt
(B) The industrial heartland of Germany
(C) The Kanto Plain in Japan
(D) The Donbas region in Ukraine

39. Given below are two statements:
Statement I : Globalization has led to the relocation of many manufacturing industries from developed countries to Less Developed Countries (LDCs).
Statement II : This relocation is primarily driven by the availability of cheap labor and lenient environmental regulations in LDCs.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

40. Which of the following is a defining characteristic of the Tourism Industry?
(A) It is a smokeless industry with significant economic linkages.
(B) It is a primary sector activity.
(C) It produces a tangible physical product.
(D) It is completely independent of transportation infrastructure.

41. E. M. Hoover's contribution to industrial location theory emphasized the importance of:
(A) minimizing transportation costs above all other factors.
(B) historical and behavioral factors.
(C) balancing transportation costs against production costs.
(D) profit maximization through market area analysis.

42. What does ICT stand for in the context of modern industrial geography?
(A) Information and Communication Technology
(B) Industrial and Commercial Trade
(C) International Commerce and Tariffs
(D) Internal Connectivity and Transport

43. Allan Pred's behavioral matrix in industrial location theory emphasizes the role of:
(A) mathematical optimization.
(B) physical resource availability.
(C) government subsidies.
(D) information availability and the decision-maker's ability to use it.

44. An increase in the world distribution and growth of knowledge production industries like R&D is most closely associated with the rise of the:
(A) agrarian economy.
(B) quaternary sector.
(C) industrial economy.
(D) primary sector.

45. An impact of globalization on the manufacturing sector in LDCs is often:
(A) a steady and significant decrease in overall industrial employment opportunities.
(B) a complete and permanent economic shift

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towards a traditional agricultural economy.
(C) the creation of new jobs, but often with low wages and poor working conditions.
(D) the rapid strengthening and protection of local, traditional artisan industries.

46. The classification of industries based on raw material would categorize a cotton textile mill as:
(A) a mineral-based industry.
(B) a forest-based industry.
(C) a marine-based industry.
(D) an agro-based industry.

47. The tendency for firms in the same industry to cluster together in one area is known as:
(A) Agglomeration
(B) Deglomeration
(C) Diversification
(D) Decentralization

48. August Losch's central place theory is distinct from Weber's because it focuses on:
(A) minimizing costs.
(B) maximizing market area and profit.
(C) raw material orientation.
(D) labor costs.

49. Which of the following is NOT considered a major world industrial region?
(A) Western and Central Europe
(B) The Amazon Rainforest
(C) North-Eastern North America
(D) Eastern Asia (Japan, China, South Korea)

50. Match List I with List II.
List I: (Location Theorist)
P. Alfred Weber
Q. August Losch
R. D. M. Smith
S. Allan Pred
List II: (Key Concept)
1. Behavioral Matrix
2. Spatial Margins to Profitability
3. Material Index
4. Cones of Demand / Profit Maximization
(A) P-4, Q-3, R-1, S-2
(B) P-3, Q-4, R-2, S-1
(C) P-3, Q-1, R-2, S-4
(D) P-1, Q-2, R-4, S-3

51. What are the three essential conditions for spatial interaction as proposed by Edward Ullman?
(A) Connectivity, Accessibility, and Gravity
(B) Distance, Cost, and Time
(C) Complementarity, Transferability, and Intervening Opportunity
(D) Supply, Demand, and Equilibrium

52. In Ullman's model, what does 'Complementarity' refer to?
(A) The ease with which a good can be transported across space.
(B) The existence of a closer, alternative source of supply.
(C) The diplomatic relationship between two interacting regions.
(D) The presence of a supply in one place and a demand in another.

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53. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The Gravity Model suggests that the interaction between two places is directly proportional to the product of their sizes.
Reason (R) : Larger places have more 'mass' and therefore exert a greater pull or attraction on other places.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

54. The concept of 'Transferability' in spatial interaction models is primarily concerned with:
(A) the political barriers between two places.
(B) the cost of overcoming distance.
(C) the similarity in language and culture.
(D) the demand for a product.

55. If a city B is located between city A and city C, and city B can satisfy the demands of city A, this illustrates which of Ullman's concepts?
(A) Complementarity
(B) Transferability
(C) Accessibility
(D) Intervening Opportunity

suggests that inequalities tend to diminish automatically over time.

Which of the above statement(s) is/are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 3 and 5
(D) 2, 4 and 5

112. The "Great Lakes-St. Lawrence" region in North America is a prominent example of:
(A) an agricultural region.
(B) a world industrial region.
(C) a sparsely populated desert.
(D) a major tourist destination.

113. A key prospect for inter-regional trade cooperation lies in:
(A) increasing protectionist policies.
(B) leveraging comparative advantages for mutual economic gain.
(C) ensuring all countries produce the same goods to avoid competition.
(D) minimizing transportation links to save costs.

114. Given below are two statements:
Statement I : The Gravity Model is a deterministic model that perfectly predicts all spatial flows.
Statement II : The model provides a probabilistic estimate of interaction, and real-world flows are affected by many factors not included in the basic formula.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

115. A major critique of Weber's least-cost theory of industrial location is that it:
(A) overemphasizes the role of market demand.
(B) ignores transportation costs.
(C) assumes entrepreneurs are perfect "economic men" who always seek to minimize costs, ignoring other motivations.
(D) is only applicable to agricultural activities.

116. Arrange the following industrial location theories in the chronological order of their main proponent's major work on the topic:
1. D. M. Smith's Spatial Margins to Profitability
2. August Losch's The Economics of Location
3. Alfred Weber's Theory of the Location of Industries
4. Allan Pred's Behavioral Matrix

(A) 2, 3, 1, 4
(B) 3, 4, 2, 1
(C) 1, 3, 2, 4
(D) 3, 2, 4, 1

117. What distinguishes a 'formal region' from a 'functional region'?
(A) A formal region has a central node, while a functional region does not.
(B) A formal region is imaginary, while a functional region is real.
(C) A formal region is characterized by uniformity, while a functional region is characterized by interaction.
(D) A formal region is small, while a functional region is large.

118. The "dependency theory of underdevelopment" is most closely associated with which school of thought?
(A) Neoclassical economics
(B) Structuralism and Marxism
(C) Postmodernism
(D) Environmental determinism

119. A major cause of the world energy crisis in the 1970s was:
(A) the sudden depletion of all global oil reserves.
(B) a worldwide ban on the use of coal.
(C) the invention of highly efficient solar panels.
(D) an oil embargo by major producing countries (OPEC).

120. Which of these is an example of an 'abiotic' natural resource?
(A) Manganese nodules
(B) Coal
(C) Fish
(D) Forests

121. The main function of the World Trade Organisation's dispute settlement mechanism is to:
(A) provide military intervention in trade conflicts.
(B) offer a legal framework for resolving trade

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65. A variant of the Gravity Model that accounts for the fact that people may be willing to travel longer distances for more specialized or higher-order goods is known as the:
(A) Potential Model.
(B) Breaking-Point Model.
(C) Ullman Model.
(D) Hurst Model.

66. Arrange the following events related to international trade in chronological order:
1. Establishment of the World Trade Organisation (WTO)
2. Signing of the General Agreement on Tariffs and Trade (GATT)
3. The Uruguay Round of trade negotiations begins
4. Formation of the European Economic Community (EEC)

(A) 2, 4, 3, 1
(B) 4, 2, 1, 3
(C) 2, 3, 4, 1
(D) 3, 2, 1, 4

67. The principle of 'Most-Favoured-Nation' (MFN) under WTO rules means that:
(A) a country can have one single favourite trading partner.
(B) developing countries are favoured over developed countries.
(C) a country must grant its most favourable trading terms to all WTO members.
(D) trade is only favoured with neighbouring nations.

68. What is a significant prospect of enhancing inter-regional cooperation and trade?
(A) Increased global political tensions.
(B) Greater economic efficiency and growth through specialization.
(C) Reduced cultural exchange between nations.
(D) Greater economic efficiency and growth through specialization.

69. The main difference between the Beta Index and the Gamma Index for measuring network connectivity is that:
(A) Beta measures accessibility, while Gamma measures connectivity.
(B) Beta is for road networks, while Gamma is for rail networks.
(C) Beta considers nodes and edges, while Gamma compares actual to potential edges.
(D) Beta is a simple count of nodes, while Gamma is a complex measure.

70. Which of the following is NOT an example of a non-tariff barrier to trade?
(A) A quota on the quantity of imported cars.
(B) A specific tax levied on each ton of imported steel.
(C) A complex and time-consuming customs inspection procedure.
(D) A regulation requiring all imported electronics to meet specific, unique safety standards.

71. In the context of spatial flow models, what does the "distance decay" effect signify?
(A) The interaction between places increases as the distance between them increases.
(B) The quality of a road deteriorates with distance from a major city.
(C) The population density decays in a linear fashion from the city center.
(D) The level of interaction between places decreases as the distance between them increases.

72. The predecessor to the World Trade Organisation (WTO) was:
(A) The General Agreement on Tariffs and Trade (GATT).
(B) The World Bank.
(C) The International Monetary Fund (IMF).
(D) The United Nations Conference on Trade and Development (UNCTAD).

73. M.E. Hurst's behavioural postulate in spatial interaction suggests that:
(A) all individuals have perfect knowledge of all travel opportunities.
(B) cost is the only factor in making a travel decision.
(C) travel decisions are based on the perceived, rather than the actual, environment.
(D) all travel is irrational and unpredictable.

74. A region defined by a shared characteristic, such as a common climate or language, is known as a:
(A) Formal Region

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(B) Fictional Region
(C) Nodal Region
(D) Functional Region

75. Match List I with List II.
List I: (Theorist)
P. Gunnar Myrdal
Q. Albert O. Hirschman
R. John Friedman
S. Andre Gunder Frank
List II: (Theory of Regional Development)
1. Core-Periphery Model
2. Unbalanced Growth and Linkages
3. Cumulative Causation
4. Dependency Theory
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-2, R-1, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-2, Q-1, R-4, S-3

76. A 'Functional Region' or 'Nodal Region' is best defined by:
(A) a uniform physical characteristic.
(B) a set of interactions or movements focused on a central node or hub.
(C) imaginary boundaries created for storytelling.
(D) administrative or political boundaries.

77. The concept of 'Fictional Regions' might be used to describe:
(A) the Corn Belt in the United States.
(B) the European Union.
(C) Middle Earth from 'The Lord of the Rings'.
(D) the Amazon river basin.

78. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : Gunnar Myrdal's theory of Cumulative Causation suggests that regional inequalities tend to perpetuate and grow over time.
Reason (R) : The 'backwash effects' (outflow of capital and labor) from the periphery to the core are typically stronger than the 'spread effects' (diffusion of growth).
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

79. According to Albert O. Hirschman, development should be promoted by deliberately creating:
(A) a strategy of unbalanced growth focusing on key sectors.
(B) perfect equilibrium across all sectors.
(C) a state of balanced growth.
(D) complete isolation from the global economy.

80. In Hirschman's theory, an industry that stimulates investment in subsequent stages of production is said to have strong:
(A) backward linkages.
(B) forward linkages.
(C) social linkages.
(D) political linkages.

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81. Consider the following statements regarding the Dependency Theory of underdevelopment:
1. Underdevelopment is not an original state but a process created by the relationship between 'core' and 'periphery' nations.
2. The development of the core is achieved at the expense of the periphery.
3. All nations follow a similar linear path to development, just at different speeds.
4. Free trade between developed and developing nations leads to mutual and equal benefits.
Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 4 only
(D) 2, 3 and 4 only

82. John Friedman's Core-Periphery model describes regional development as a process occurring in how many stages?
(A) Four
(B) Two
(C) Three
(D) Five

83. Which of the following is an example of a Global Economic Bloc?
(A) The United Nations (UN)
(B) The World Wildlife Fund (WWF)
(C) The European Union (EU)
(D) The International Olympic Committee

(IOC)

84. The 'spread effects' in Gunnar Myrdal's theory refer to:
(A) the out-migration of talented labor from a poor region.
(B) the draining of capital from the periphery to the core.
(C) the negative environmental impacts of industrialization.
(D) the diffusion of growth and innovation from the core to the periphery.

85. The term 'typology of regions' in geography refers to:
(A) the study of place names.
(B) the process of mapping regions.
(C) a classification system for different types of regions.
(D) a historical account of a single region.

86. Consider the following characteristics:
1. Defined by a set of functional interactions.
2. Has a central focal point or node.
3. Boundaries are often fluid and non-uniform.
4. Also known as a 'nodal' region.
5. The circulation area of a daily newspaper is a classic example.

Which of the above statement(s) is/are correct?
(A) 1, 2, 4, and 5
(B) 1, 2, 3, 4, and 5
(C) 2, 3, and 5 only
(D) 1 and 4 only

87. World regional disparities are most evident in the contrast between:
(A) North and South poles.
(B) Eastern and Western Hemispheres.
(C) Urban and suburban areas.
(D) The Global North (developed countries) and the Global South (developing countries).

88. The main argument of the Dependency Theory is that the poverty of developing countries is:
(A) a direct consequence of their integration into the capitalist world system in a subordinate position.
(B) a result of their own internal cultural and political failings.
(C) a temporary stage on the path to development.
(D) caused by overpopulation and lack of natural resources.

89. A social movement in India focused on regional development might typically demand:
(A) a ban on all forms of industrial activity.
(B) the adoption of a foreign language.
(C) the creation of a new state for better governance and resource allocation.
(D) secession from international trade agreements.

90. In Friedman's final stage of regional development, a 'functionally interdependent system of cities', what is the expected outcome?
(A) Regional inequalities are significantly reduced and a balanced national space economy emerges.
(B) The core completely dominates the periphery.
(C) The periphery breaks away from the core.
(D) The entire system collapses into a pre-industrial state.

91. The concept of 'backwash effects' is most closely associated with which theorist?
(A) John Friedman
(B) Albert O. Hirschman
(C) Andre Gunder Frank
(D) Gunnar Myrdal

92. The idea that investment should be concentrated in a few key sectors that will pull the rest of the economy forward is central to the theory of:
(A) Balanced Growth.
(B) Unbalanced Growth.
(C) Cumulative Causation.
(D) Core-Periphery.

93. Which of the following is NOT a type of region in the standard geographical typology?
(A) Formal
(B) Functional
(C) Metaphysical
(D) Perceptual/Vernacular

94. The existence of significant disparities in income, healthcare, and education between different parts of the world is referred to as:
(A) global uniformity.
(B) cultural homogenization.

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56. Consider the following statements about measures of connectivity:
1. The Beta Index measures the relationship between the number of links and the number of nodes in a network.
2. A high Beta Index value indicates a well-connected network.
3. The Alpha Index is calculated by comparing the number of actual circuits to the maximum possible circuits in a network.
4. An Alpha Index of 0 indicates a network with no circuits.

Which of the above statement(s) is/are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2, 3 and 4
(D) 1, 3 and 4 only

57. The World Trade Organisation (WTO) primarily aims to:
(A) provide development loans to poor countries.
(B) regulate international currency exchange rates.
(C) supervise and liberalize international trade.
(D) control global migration patterns.

58. M. E. Hurst's model of spatial interaction is a critique and extension of Ullman's model, adding a:
(A) behavioral and cognitive dimension.
(B) purely economic perspective.
(C) historical dimension.
(D) focus on political boundaries.

59. The 'Gravity Model' predicts that interaction between two places will decrease as:
(A) their populations increase.
(B) their economic size increases.
(C) transportation technology improves.
(D) the distance between them increases.

60. 'Accessibility' in transport geography is best defined as:
(A) the physical distance between two points.
(B) the ease with which a location can be reached from other locations.
(C) the number of routes available in a network.
(D) the total length of a transport network.

61. Consider the following statements regarding the process of globalization:
1. It involves increasing interconnectedness in economic, cultural, and political spheres.
2. It is solely an economic phenomenon driven by multinational corporations.
3. It leads to a reduction in the importance of national borders and state sovereignty.
4. The process is facilitated by advances in communication and transportation technologies.
5. It results in uniform benefits for all countries and regions of the world.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 5
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 4, and 5

62. Liberalisation in the context of world trade patterns refers to:
(A) increasing tariffs and trade barriers.
(B) government nationalization of key industries.
(C) promoting self-sufficiency and discouraging international trade.
(D) the removal or reduction of restrictions or barriers on the free exchange of goods.

63. Which of the following is a major problem for intra-regional trade in many developing regions?
(A) The economies are often competitive rather than complementary.
(B) The transportation networks are excessively developed.
(C) There is a complete lack of demand for goods.
(D) The regions have identical resource endowments.

64. Given below are two statements:
Statement I : The formation of regional trade blocs like the EU or NAFTA is a manifestation of inter-regional cooperation.
Statement II : Such blocs aim to reduce internal trade barriers while potentially maintaining common external tariffs.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

104. In the context of economic activities, what distinguishes the quaternary sector from the tertiary sector?
(A) The quaternary sector focuses on knowledge-based activities like R&D, while the tertiary sector provides more conventional services.
(B) The quaternary sector involves physical labor, while the tertiary sector is service-based.
(C) The quaternary sector is only found in developing countries.
(D) The tertiary sector is a recent development, whereas the quaternary is older.

105. Sustainable natural resource management aims to balance which three pillars?
(A) Economic growth, political power, and military strength.
(B) Social equity, environmental protection, and economic viability.
(C) Social equity, environmental protection, and economic viability.
(D) Resource extraction, resource processing, and resource consumption.

106. Consider the following statements regarding Von Thunen's model:
1. It is based on the concept of economic rent or 'locational rent'.
2. It assumes an isotropic plain with a single central market.
3. It assumes uniform transportation costs in all directions.
4. It predicts that goods with high transport costs and high perishability will be produced far from the market.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2, and 3 only
(C) 3 and 4 only
(D) 1, 2, 3, and 4

107. The 'Material Index' (MI) in Weber's theory is calculated as:
(A) The weight of the final product divided by the weight of localized raw materials.
(B) The cost of labor divided by the cost of transport.
(C) The distance to market divided by the weight of the final product.
(D) The weight of localized raw materials divided by the weight of the final product.

108. If the Material Index is greater than 1, the industry will tend to be located:
(A) near the market.
(B) near the source of raw material.
(C) at an intermediate location between market and material.
(D) anywhere, as it is footloose.

109. What is the primary difference between J.C. Weaver's method and K. Doi's method of crop combination?
(A) Weaver's method is for subsistence farming, while Doi's is for commercial farming.
(B) Weaver considers 5 crops, while Doi considers 10.
(C) Weaver uses standard deviation, while Doi uses the sum of squared differences, which is simpler to calculate.
(D) Doi's method is designed for Japan, while Weaver's is for the USA.

110. Which of the following represents a 'backward linkage' for a car manufacturing plant?
(A) A car dealership that sells the finished cars.
(B) A marketing agency that creates advertisements for the car.
(C) A government agency that registers the new cars.
(D) A steel mill that supplies sheet metal to the car plant.

111. Consider the following statements regarding regional development theories:
1. Gunnar Myrdal introduced the concept of 'spread' and 'backwash' effects.
2. Albert O. Hirschman advocated for a 'balanced growth' strategy.
3. John Friedman's model describes development through a series of core-periphery stages.
4. Dependency theory argues that underdevelopment is an internally generated condition.
5. The concept of 'cumulative causation'

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(C) political alignment.
(D) world regional disparities.

95. Given below are two statements:
Statement I : Social movements in India, such as the demand for Gorkhaland or Telangana, are often rooted in perceptions of regional neglect and underdevelopment.
Statement II : These movements are exclusively driven by linguistic differences with no economic component.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

96. Which of the following correctly pairs the theorist with their key idea?
(A) Myrdal - Unbalanced Growth
(B) Friedman - Core-Periphery
(C) Hirschman - Cumulative Causation
(D) Frank - Spread Effects

97. An industry processing perishable raw materials like fruits for canning would, according to Weber's theory, most likely be:
(A) market-oriented.
(B) raw-material-oriented.
(C) footloose.
(D) labor-oriented.

98. The most significant factor contributing to the growth of the ICT and knowledge production industries is:
(A) access to a highly educated workforce and robust communication networks.
(B) the availability of cheap, unskilled labor.
(C) proximity to large deposits of coal.
(D) government policies that restrict international data flow.

99. In Land Capability Classification, what does a higher class number (e.g., Class VII vs. Class II) indicate?
(A) Greater suitability for a wide range of crops.
(B) Fewer and less severe limitations for cultivation.
(C) More severe limitations and narrower choices for agricultural use.
(D) Higher market value of the land.

100. Match List I with List II.
List I: (Geographic Concept)
P. Spatial Interaction
Q. Spatial Flow
R. Connectivity
S. Accessibility
List II: (Description)
1. The degree of directness of links between places in a network
2. The movement of people, goods, or information between locations
3. The ease of reaching a location from other locations
4. The general concept of movement and relationship between places
(A) P-1, Q-3, R-2, S-4
(B) P-4, Q-2, R-1, S-3
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-4, R-3, S-1

101. An example of a 'quinary' activity, sometimes considered a subdivision of the quaternary sector, is:
(A) a factory worker on an assembly line.
(B) a farmer growing wheat.
(C) a high-level government official or a top corporate CEO.
(D) a bus driver.

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102. Which statement incorrectly describes the problems associated with natural resources?
(A) Many critical resources are non-renewable and finite.
(B) All natural resources are equally easy to access and exploit.
(C) The distribution of resources is uneven across the globe.
(D) The exploitation of resources often leads to environmental degradation.

103. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The tourism industry is often called an "invisible export".
Reason (R) : It earns foreign exchange for a country when foreign tourists spend money on services and goods, similar to how physical exports earn foreign exchange.
(A) Both A and R are true and R is the correct explanation of A.

disputes between member countries.
(C) offer a legal framework for resolving trade disputes between member countries.
(D) impose economic sanctions on non-member countries.

122. In the context of agricultural systems, 'paddy cultivation' is a form of:
(A) intensive subsistence agriculture.
(B) dry farming.
(C) extensive commercial farming.
(D) nomadic herding.

123. The 'agglomeration' factor in Weber's theory refers to the cost savings that accrue to a firm from:
(A) locating in an isolated, remote area.
(B) using cheaper, lower-quality raw materials.
(C) automating its production line.
(D) clustering with other firms, sharing infrastructure and services.

124. Which geographer introduced a behavioral dimension to the study of spatial interaction, criticizing Ullman's purely economic-rational framework?
(A) August Losch
(B) M. E. Hurst
(C) J. C. Weaver
(D) Gunnar Myrdal

125. Match List I with List II.
List I: (Regional Bloc)
P. NAFTA (now USMCA)
Q. ASEAN
R. MERCOSUR
S. EU
List II: (Primary Member Countries/Region)
1. Brazil, Argentina, Uruguay
2. Germany, France, Italy
3. USA, Canada, Mexico
4. Indonesia, Thailand, Vietnam
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-3, R-1, S-4

126. The primary focus of August Losch's location theory is on finding the location that provides the:
(A) lowest transport cost.
(B) best access to skilled labor.
(C) greatest agglomeration economies.
(D) largest possible market area and maximum profit.

127. A problem with intra-regional cooperation among developing countries is that they often:
(A) produce similar primary commodities, making them competitors rather than partners.
(B) have very strong and efficient transport links between them.
(C) have highly diverse and complementary economies.
(D) lack any political will for cooperation.

128. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The globalization of manufacturing has led to a 'new international division of labor'.
Reason (R) : Production processes are now fragmented globally, with R&D and management often located in developed countries and labor-intensive assembly in developing countries.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

129. The concept of 'development from below', which emphasizes local participation and empowerment, is a key theme in the work of:
(A) John Friedman
(B) Alfred Weber
(C) Andre Gunder Frank
(D) Albert O. Hirschman

130. Which of the following is NOT an assumption of the basic Von Thunen model?
(A) Varying soil fertility and climate.
(B) An isolated state.
(C) A single central market.
(D) Farmers are rational profit-maximizers.

131. Consider the following statements regarding 'backwash effects' in Myrdal's theory of cumulative causation:

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non-renewable are natural.
(B) Renewable resources are always cheaper than non-renewable ones.
(C) Renewable resources can be replenished within a human lifespan, while non-renewable resources cannot.
(D) Renewable resources are biotic, while non-renewable resources are abiotic.

170. A major problem in managing global commons like the high seas or Antarctica is:
(A) the absence of a single sovereign authority to enforce rules.
(B) the lack of valuable resources in these areas.
(C) their easy accessibility to all nations.
(D) the slow rate of environmental change in these regions.

171. The 'Silicon Valley' in California is a prime example of a region dominated by which type of industries?
(A) Primary resource extraction
(B) Heavy manufacturing
(C) Agro-based processing
(D) ICT and Knowledge Production

172. The main contribution of August Losch to industrial location theory was shifting the focus from least-cost analysis to:
(A) environmental impact analysis.
(B) market area and profit maximization analysis.
(C) labor union negotiations.
(D) historical path dependency.

173. The 'Dependency Ratio' is a concept often used in:
(A) industrial geography.
(B) agricultural geography.
(C) development studies and regional geography.
(D) transport geography.

174. Which of these activities is NOT part of the secondary sector?
(A) Iron smelting
(B) Car assembly
(C) Construction
(D) Call center operation

175. Match List I with List II.
List I: (Class of Land - Land Capability)
P. Class I
Q. Class IV
R. Class VI
S. Class VIII
List II: (Description of Use)
1. Severe limitations; suitable for grazing or forestry, not cultivation.
2. Very severe limitations; restricted to recreation, wildlife, or water supply.
3. Few limitations; suitable for a wide range of plants and may be used for cultivated crops.
4. Very severe limitations that restrict the choice of plants; requires careful management for cultivation.
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-3, R-1, S-4

176. Which of the following is an example of a 'spread effect' in Myrdal's model?
(A) Capital flowing from a poor region to a rich one.
(B) A factory in a core region creating demand for raw materials from a peripheral region.
(C) Skilled workers leaving the periphery for jobs in the core.
(D) Brain drain from developing countries.

177. A country that relies heavily on the export of a single primary commodity (e.g., coffee or copper) faces the economic risk of:
(A) rapid industrialization.
(B) price volatility in the global market.
(C) an overly diversified economy.
(D) lack of demand for its product.

178. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The Gravity Model of spatial interaction needs to be calibrated with a distance exponent that can vary for different types of trips.
Reason (R) : People are generally more willing to travel longer distances for high-value shopping or specialized medical care than for daily grocery shopping.
(A) Both A and R are true and R is the correct explanation of A.

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available to a decision-maker.
Statement II : Pred argued that the location decisions of entrepreneurs are always perfectly rational and optimal.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

140. Land Use Planning at a regional level primarily seeks to:
(A) prevent any changes to the existing land use pattern.
(B) resolve conflicts between competing land uses and promote sustainable development.
(C) ensure that all land is used for industrial purposes.
(D) sell all public land to private developers.

141. The final stage of John Friedman's four-stage core-periphery model is characterized by:
(A) a single, dominant primate city.
(B) the emergence of strong regional sub-cores.
(C) a functionally integrated and interdependent national space-economy.
(D) a pre-industrial society with scattered, small settlements.

142. A key feature of 'plantation agriculture' as an agricultural system is:
(A) its focus on subsistence food crops for local consumption.
(B) its small-scale, family-run nature.
(C) its use of slash-and-burn techniques.
(D) its large-scale, monocultural production of cash crops for export.

143. The growth of the knowledge economy has led to the increasing importance of which factor in industrial location?
(A) Availability of a highly skilled and educated workforce
(B) Proximity to coalfields
(C) Access to deep-water ports
(D) Large tracts of inexpensive, flat land

144. In Ullman's framework, if a product is extremely fragile or expensive to ship, it has low:
(A) Complementarity.
(B) Transferability.
(C) Intervening Opportunity.
(D) Accessibility.

145. "The development of underdevelopment" is a core concept proposed by:
(A) Andre Gunder Frank
(B) Walt Rostow
(C) Gunnar Myrdal
(D) Albert O. Hirschman

146. Which method of delineating crop combination regions did Rafiullah propose as a modification to Weaver's technique to make it more accurate for varied agricultural landscapes?
(A) The Maximum Positive Deviation Method
(B) The Minimum Deviation Method
(C) The Logarithmic Transformation Method
(D) The Gini Coefficient Method

147. What is the fundamental purpose of creating a typology of regions?
(A) To prove that all regions are identical.
(B) To create political propaganda.
(C) To create a system for understanding, comparing, and analyzing spatial patterns and processes.
(D) To determine the best region in the world.

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148. A clothing company that outsources its manufacturing to a factory in Bangladesh while keeping its design and marketing departments in Italy is an example of:
(A) the failure of the tourism industry.
(B) a primary economic activity.
(C) a policy of national self-sufficiency.
(D) the impact of globalization on the manufacturing sector.

149. The measurement of agricultural productivity as "yield per hectare" is a measure of:
(A) labour productivity.
(B) capital productivity.
(C) land productivity.
(D) total factor productivity.

150. Match List I with List II.
List I: (Spatial Interaction Concept)
P. Complementarity
Q. Transferability
R. Intervening Opportunity
S. Distance Decay
List II: (Example)

(B) Paul Rosenstein-Rodan
(C) Ragnar Nurkse
(D) Albert O. Hirschman

188. A key difference between a "fictional region" and a "formal region" is that:
(A) a fictional region is always larger than a formal region.
(B) a fictional region has no basis in reality, while a formal region is defined by measurable data.
(C) a fictional region is defined by function, while a formal region is defined by culture.
(D) there is no difference between them.

189. A primary driver of the World Energy Crisis is the global economy's heavy reliance on:
(A) renewable energy sources.
(B) nuclear power.
(C) fossil fuels.
(D) hydroelectric power.

190. What does the term "quaternary" signify in the context of economic activities?
(A) The fourth stage in processing a raw material.
(B) Activities that occur only once every four years.
(C) A classification based on the number of employees.
(D) The economic sector dealing with information and knowledge.

191. A significant change in world trade patterns since the mid-20th century is:
(A) the increasing share of services and high-tech products in global trade.
(B) the decline in the trade of manufactured goods.
(C) the complete dominance of primary commodities in trade.
(D) the cessation of trade between developed and developing countries.

192. Which of the following is NOT a measure or index of network connectivity or accessibility?
(A) Beta Index
(B) Material Index
(C) Gamma Index
(D) Shimbel Index (Accessibility)

193. The Green Revolution, a key event in agricultural geography, involved:
(A) a return to organic farming methods.
(B) the development and spread of high-yield variety (HYV) seeds, fertilizers, and irrigation.
(C) a political movement to protect forests.
(D) the large-scale cultivation of green-colored vegetables.

194. The existence of the European Union (EU) both promotes free trade among its members and creates a common trade policy towards non-members. This illustrates the dual nature of:
(A) intra-regional cooperation.
(B) global free trade.
(C) dependency theory.
(D) world regional disparities.

195. The main objective of S.M. Rafiullah in modifying Weaver's method was to:
(A) include a larger number of crops in the analysis.
(B) give more weight to the higher-ranking crops in a combination.
(C) simplify the calculations for manual use.
(D) make it applicable only to the Indian context.

196. An area that is homogenous in terms of one or more specific criteria, such as language, climate, or income level, is a:
(A) Functional Region.
(B) Nodal Region.
(C) Fictional Region.
(D) Formal Region.

197. According to Weber's theory, an industry where the final product is heavier or bulkier than the localized raw materials (e.g., bread baking, bottling) would be:
(A) raw-material-oriented.
(B) labor-oriented.
(C) market-oriented.
(D) power-oriented.

198. The main argument of Hirschman's theory of unbalanced growth is that:
(A) investment should be spread thinly across all sectors of the economy.
(B) developing countries lack the resources for

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160. What is a key challenge for the World Trade Organisation (WTO) in the 21st century?
(A) A lack of member countries.
(B) Addressing issues like environmental protection and labor standards within its trade framework.
(C) The complete cessation of global trade.
(D) The fact that all trade disputes have been permanently resolved.

161. Consider the following statements regarding theories of industrial location:
1. Alfred Weber's theory is a least-cost approach.
2. August Losch's theory is a profit-maximization approach.
3. E.M. Hoover integrated transport and production costs.
4. Allan Pred introduced behavioral elements into location decisions.
5. D.M. Smith's model focuses exclusively on labor costs.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 4
(B) 1, 2, and 5
(C) 2, 3, and 4
(D) 1, 3, 4, and 5

162. The theory of 'cumulative causation' was propounded by Gunnar Myrdal to explain:
(A) why regional economic inequalities persist and often intensify.
(B) why all regions tend to develop at the same rate.
(C) the process of agricultural crop combination.
(D) the optimal location for a single factory.

163. The concept of 'linkages' (forward and backward) is central to the regional development theory of:
(A) Gunnar Myrdal
(B) John Friedman
(C) Albert O. Hirschman
(D) Andre Gunder Frank

164. Given below are two statements:
Statement I : Mediterranean agriculture is characterized by viticulture (grape cultivation) and the production of citrus fruits.
Statement II : This agricultural system is found exclusively in the countries bordering the Mediterranean Sea.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

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165. The Beta Index in network analysis is calculated using the formula e/v, where 'e' is the number of edges (links) and 'v' is the number of vertices (nodes). A network with 10 nodes and 13 links would have a Beta Index of:
(A) 0.77
(B) 10
(C) 1.3
(D) 13

166. Arrange the following economic activities in the typical sequence of a nation's economic development:
1. Dominance of Information and R&D industries.
2. Dominance of agriculture and raw material extraction.
3. Dominance of service industries like retail, finance, and transport.
4. Dominance of manufacturing and processing industries.

(A) 1, 2, 3, 4
(B) 2, 4, 3, 1
(C) 2, 3, 4, 1
(D) 4, 2, 1, 3

167. A region like the 'Midwest' in the United States, which is widely recognized and has a commonly understood identity but lacks precise, official boundaries, is best described as a:
(A) Formal Region
(B) Functional Region
(C) Fictional Region
(D) Perceptual (or Vernacular) Region

168. The increasing integration and interdependence of national, regional, and local economies across the world is known as:
(A) Economic Globalization
(B) Regionalization
(C) Nationalization
(D) Isolationism

169. What is the primary difference between a 'renewable' and a 'non-renewable' resource?
(A) Renewable resources are man-made, while

(C) Ullman's Interaction Model.
(D) Myrdal's Causation Model.

208. The rise of R&D and higher education as key industries signifies a shift towards a:
(A) resource-based economy.
(B) knowledge-based economy.
(C) labor-based economy.
(D) agriculture-based economy.

209. A primary criticism leveled against the Dependency Theory is that it:
(A) places too much emphasis on internal factors for underdevelopment.
(B) can be seen as overly deterministic, downplaying the agency of developing nations.
(C) advocates for free trade as the solution to poverty.
(D) ignores the historical context of colonialism.

210. The Chipko movement in India, while primarily an environmental movement, also reflects concerns of:
(A) regional development and local communities' rights over resources.
(B) establishing a new industrial zone.
(C) promoting international trade.
(D) building a new capital city.

211. Consider the following statements regarding the Geography of Transport and Trade:
1. Edward Ullman proposed the three bases for interaction: complementarity, transferability, and intervening opportunity.
2. The Gravity Model states that interaction is inversely proportional to distance and directly proportional to size.
3. The World Trade Organisation (WTO) is the successor to the General Agreement on Tariffs and Trade (GATT).
4. Liberalisation involves increasing tariffs and non-tariff barriers to protect domestic industries.
5. M. E. Hurst added a behavioral perspective to Ullman's model of spatial interaction.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 5
(B) 1, 2, and 4
(C) 2, 3, 4, and 5
(D) 1, 3, and 5

212. What is the fundamental idea behind Land Capability Classification?
(A) To determine land's value for urban development.
(B) To create a new system of political boundaries.
(C) To map the historical ownership of land parcels.
(D) To classify land based on its suitability for sustained agricultural production without degradation.

213. The industrial revolution first began in which world region?
(A) Japan
(B) The United States
(C) Great Britain / Western Europe
(D) Russia

214. Given below are two statements:
Statement I : Globalisation facilitates the rapid movement of capital, goods, and information across borders.
Statement II : The movement of labor across international borders is just as free and unrestricted as the movement of capital.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

215. A software development firm that can serve global clients from a single office in Bangalore is a good example of a:
(A) raw-material oriented industry.
(B) market-oriented industry.
(C) weight-losing industry.
(D) footloose industry.

216. Arrange the following theorists of regional development based on the approximate chronological order in which their major theories gained prominence:
1. Andre Gunder Frank (Dependency Theory)
2. Gunnar Myrdal (Cumulative Causation)
3. Albert O. Hirschman (Unbalanced Growth)
4. John Friedman (Core-Periphery Model)

(A) 2, 3, 4, 1
(B) 1, 2, 3, 4
(C) 4, 1, 2, 3
(D) 3, 2, 1, 4

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

179. The theoretical basis of Weaver's crop combination method is to find the combination that shows the:
(A) maximum deviation from a theoretical curve.
(B) highest total percentage of cropped area.
(C) least deviation from a theoretical curve.
(D) lowest number of crops.

180. The primary purpose of global economic blocs like ASEAN or MERCOSUR is to:
(A) promote military alliances.
(B) foster cultural exchange exclusively.
(C) compete with the United Nations.
(D) facilitate economic integration and trade among member nations.

181. Consider the following statements regarding the tourism industry:
1. It is a major source of foreign exchange earnings for many countries.
2. It has strong forward and backward linkages with other sectors like transport and hospitality.
3. It is considered an environmentally benign "smokeless" industry, though it can have negative impacts.
4. It is completely unaffected by political instability or health crises.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) 1, 2, 3 and 4

182. A steel plant requiring large amounts of coal and iron ore, which are heavy and lose weight during processing, is best located near the raw material sources. This is an example of a:
(A) market-oriented industry.
(B) weight-losing industry.
(C) footloose industry.
(D) weight-gaining industry.

183. The study of the spatial distribution of economic activities, from production to consumption, is the core subject matter of:
(A) Political Geography.
(B) Cultural Geography.
(C) Geomorphology.
(D) Economic Geography.

184. Given below are two statements:
Statement I : The WTO's principle of "national treatment" means foreign and local goods should be treated equally once they have entered the market.
Statement II : This principle allows countries to apply higher internal taxes on imported goods than on domestically produced goods.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

185. In John Friedman's core-periphery model, the initial stage is characterized by:
(A) a highly integrated national economy.
(B) multiple strong, competing cores.
(C) a series of independent local centers with minimal interaction.
(D) a dominant core and a passive periphery.

186. Consider the following statements regarding potential problems associated with inter- and intra-regional cooperation and trade:
1. Loss of national sovereignty to a regional body.
2. Increased competition for less efficient domestic industries.
3. Trade disputes and disagreements over regulations.
4. Unequal distribution of benefits among member states.
5. A complete stop to trade with non-member countries.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3 and 4
(B) 2, 3, 4 and 5
(C) 1, 3 and 5
(D) 1, 2 and 5

187. "Unbalanced growth" as a development strategy was forcefully advocated by:
(A) Gunnar Myrdal

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1. A shopper goes to a nearby mall instead of a better one further away.
2. Florida has a surplus of oranges, while New England has a demand for them.
3. The volume of phone calls between two cities is much lower than between two cities of similar size that are closer together.
4. It is not profitable to transport fresh sand and gravel over very long distances due to its low value and high weight.

(A) P-1, Q-2, R-3, S-4
(B) P-2, Q-4, R-1, S-3
(C) P-2, Q-1, R-4, S-3
(D) P-4, Q-3, R-1, S-2

151. Which factor is NOT a major determinant of agricultural productivity?
(A) Institutional factors like land tenure.
(B) Technological factors like irrigation.
(C) Environmental factors like climate and soil.
(D) The national anthem of the country.

152. The classification of industries as 'public sector', 'private sector', and 'joint sector' is based on:
(A) ownership.
(B) the raw material used.
(C) the size of the industry.
(D) the nature of the finished product.

153. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : A footloose industry is not tied to any specific location.
Reason (R) : For footloose industries, transport costs are a very small component of their total costs, and their products are often lightweight and high-value.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

154. The main cause of 'world regional disparities' is rooted in:
(A) historical processes like colonialism and uneven economic development.
(B) differences in latitude and longitude.
(C) random chance and luck.
(D) uniform distribution of resources and opportunities.

155. A newspaper's delivery area is a classic example of what type of region?
(A) Formal Region
(B) Uniform Region
(C) Fictional Region
(D) Functional (Nodal) Region

156. Consider the following statements regarding potential negative impacts of globalization on the manufacturing sector of LDCs:
1. Increased competition from foreign firms, potentially harming local industries.
2. Exploitation of labor with low wages and poor working conditions.
3. Over-dependence on foreign markets and capital.
4. Degradation of the environment due to lax regulations.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2, and 3 only
(D) 1, 2, 3, and 4

157. According to Dependency Theory, the relationship between core and periphery nations is one of:
(A) mutual interdependence and equality.
(B) complete isolation from one another.
(C) exploitation and structural inequality.
(D) temporary disparity that will self-correct.

158. Which of the following is a key component of Natural Resources Management?
(A) Maximizing extraction rates for short-term profit.
(B) Ignoring the environmental impact of resource use.
(C) Privatizing all common property resources.
(D) Implementing policies for conservation and sustainable utilization.

159. The primary, secondary, tertiary, and quaternary sectors are classifications based on:
(A) the nature of the economic activity.
(B) the location of the activity.
(C) the size of the workforce.
(D) the level of government control.

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balanced growth, so strategic imbalances can trigger development.
(C) economic growth is a smooth, continuous process.
(D) all development should be state-controlled.

199. What is a significant limitation of using Gross Domestic Product (GDP) per capita as a sole measure of regional development?
(A) It is too difficult to calculate.
(B) It perfectly captures the quality of life and social well-being.
(C) It only measures the agricultural sector's output.
(D) It averages wealth and can hide significant income inequality within a region.

200. Match List I with List II.
List I: (Term from Regional Development Theory)
P. Forward and Backward Linkages
Q. Spread and Backwash Effects
R. Core-Periphery Stages Model
S. Development of Underdevelopment
List II: (Associated Theorist)
1. John Friedman
2. Gunnar Myrdal
3. Andre Gunder Frank
4. Albert O. Hirschman
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-2, R-1, S-3
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-4, R-1, S-3

201. Which sector of the economy experiences the most employment in a post-industrial society?
(A) Primary
(B) Secondary
(C) Tertiary and Quaternary
(D) All sectors are equal

202. The World Energy Crisis highlights the geopolitical importance of regions with large reserves of:
(A) petroleum and natural gas.
(B) iron ore.
(C) timber.
(D) copper.

203. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : In Von Thunen's model, land rent decreases with increasing distance from the central market.
Reason (R) : The model assumes that soil fertility is uniform everywhere, so the only variable affecting profitability is the transport cost to the market.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

204. "Nomadic herding" is an agricultural system primarily adapted to which type of environment?
(A) Tropical rainforests
(B) Arid and semi-arid lands
(C) Humid subtropical zones
(D) Arctic tundra

205. The process of deglomeration occurs when:
(A) firms cluster together to share benefits.
(B) a firm integrates vertically by buying its suppliers.
(C) firms move away from a crowded, expensive industrial cluster due to rising costs and congestion.
(D) a government offers subsidies for industries to locate in a specific zone.

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206. Consider the following statements regarding the factors of industrial location:
1. Access to raw materials.
2. Availability and cost of labor.
3. Proximity to markets.
4. Government policies and political stability.
Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) 1, 2, 3 and 4

207. A model that tries to predict the point between two towns where a consumer would be indifferent to shopping in either town is the:
(A) Breaking-Point model.
(B) Gravity Model.

1. The migration of young, skilled labor from a peripheral region to the core region.
2. The flow of capital and savings from the periphery to be invested in the more profitable core.
3. The establishment of new branch plants from the core in the periphery.
4. Increased demand in the core for agricultural and raw materials from the periphery.
5. The diffusion of innovation and technology from the core to the periphery.

Which of the above statement(s) is/are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1, 2 and 5
(D) 3, 4 and 5

132. The process of crop diversification is often encouraged by governments to:
(A) enforce monoculture and simplify agricultural administration.
(B) reduce farmers' income and increase their dependence on subsidies.
(C) increase the country's reliance on imported food.
(D) mitigate risks from price fluctuations and climate change, and improve nutrition.

133. D.M. Smith's 'spatial margins to profitability' delineates an area within which:
(A) transport costs are zero.
(B) only a single firm can exist.
(C) a firm can locate and earn a profit.
(D) labor costs are higher than revenue.

134. Which of the following best exemplifies the concept of 'intervening opportunity'?
(A) A company builds a factory close to its raw material source.
(B) A tourist decides to visit a nearby beach instead of a more distant, famous one they had originally planned to see.
(C) Two cities are connected by a new high-speed railway.
(D) A person chooses the most expensive mode of transport available.

135. The 'North-South divide' is a term used to describe:
(A) the boundary between the northern and southern hemispheres.
(B) the difference in climate between polar and equatorial regions.
(C) a major shipping route through the Panama Canal.
(D) the socio-economic and political division between wealthy, developed countries (the 'North') and poorer, developing countries (the 'South').

136. Consider the following statements regarding 'backwash effects' in Myrdal's theory of cumulative causation:
1. The migration of young, skilled labor from a peripheral region to the core region.
2. The flow of capital and savings from the periphery to be invested in the more profitable core.
3. The establishment of new branch plants from the core in the periphery.
4. Increased demand in the core for agricultural and raw materials from the periphery.
5. The diffusion of innovation and technology from the core to the periphery.

Which of the above statement(s) is/are correct?
(A) 1 and 2
(B) 3 and 4
(C) 1, 2 and 5
(D) 3, 4 and 5

137. Which of the following is an example of a social movement in India directly related to regional development aspirations?
(A) The Chipko Movement
(B) The Narmada Bachao Andolan
(C) The demand for the creation of the state of Jharkhand
(D) The Swadeshi Movement

138. The liberalisation of world trade under the WTO has led to:
(A) increased competition for domestic industries in many countries.
(B) a universal increase in tariffs and quotas.
(C) a significant reduction in global trade volumes.
(D) the complete elimination of regional trade blocs.

139. Given below are two statements:
Statement I : Allan Pred's behavioral matrix considers the quantity and quality of information

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217. The primary goal of a producer, according to August Losch's model, is to:
(A) minimize transport costs.
(B) locate as close to the labor source as possible.
(C) maximize profits by controlling the largest possible market area.
(D) follow government directives on location.

218. An example of an 'invisible' trade item is:
(A) financial services provided by a London-based bank to a client in New York.
(B) wheat exported from the USA.
(C) crude oil imported by Japan.
(D) cars manufactured in Germany.

219. Regional variations in agricultural productivity within a single country are often LEAST related to:
(A) variations in soil quality and climate.
(B) disparities in irrigation and infrastructure.
(C) differences in land tenure and farm size.
(D) the aesthetic design of the country's national flag.

220. The concept that development in the 'core' regions is intrinsically linked to and causes the underdevelopment of 'periphery' regions is the central tenet of:
(A) Modernization Theory.
(B) Dependency Theory.
(C) Unbalanced Growth Theory.
(D) Weber's Industrial Location Theory.

221. Which economic activity is directly dependent on the exploitation of natural resources?
(A) Secondary activities
(B) Tertiary activities
(C) Primary activities
(D) Quaternary activities

222. The main challenge posed by an 'intervening opportunity' to spatial interaction is that it:
(A) increases the cost of transport.
(B) makes transferability impossible.
(C) increases the attraction between the original origin and destination.
(D) diminishes the complementarity between the original supply and demand points.

223. In industrial classification, a cement factory would be considered a:
(A) mineral-based industry.
(B) forest-based industry.
(C) agro-based industry.
(D) marine-based industry.

224. Which of the following is NOT a global economic bloc?
(A) EU
(B) NATO
(C) USMCA (formerly NAFTA)
(D) ASEAN

225. Match List I with List II.
List I: (Scholar)
P. J.C. Weaver
Q. K. Doi
R. S.M. Rafiullah
S. Von Thunen
List II: (Crop Combination Method)
1. Used sum of squared differences from a theoretical model
2. Developed a model of agricultural land use rings
3. Used maximum positive deviation to modify a previous method
4. Used standard deviation to minimize variance from a theoretical curve
(A) P-1, Q-4, R-3, S-2
(B) P-4, Q-1, R-3, S-2
(C) P-4, Q-3, R-1, S-2
(D) P-2, Q-1, R-4, S-3

226. The increasing importance of education and R&D in the global economy is a defining feature of the rise of the:
(A) Knowledge Economy.
(B) Industrial Revolution.
(C) Agricultural Revolution.
(D) Green Revolution.

227. The 'Tragedy of the Commons' is a concept often used to explain a problem in:
(A) industrial location.
(B) regional development theory.
(C) natural resource management.
(D) crop combination delineation.

228. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R).
Assertion (A) : The formation of regional trade

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260. Which of the following is NOT mentioned in the passage as a criterion for classifying natural resources?
(A) Market value (high/low).
(B) Origin (biotic/abiotic).
(C) Exhaustibility (renewable/non-renewable).
(D) Stage of development (potential/actual).

Direction : Please read the following source carefully.

The theoretical underpinnings of industrial geography provide frameworks for understanding why manufacturing activities locate where they do. Alfred Weber's theory of industrial location, a foundational concept, is a least-cost model that emphasizes the minimization of transportation costs for raw materials and finished products, as well as labour costs. Edgar M. Hoover expanded on this by further analyzing transport costs and introducing the concept of transfer costs. In contrast, August Lösch shifted the focus from least-cost to a maximum-profit approach, centered on identifying the optimal market area for a firm. His model sought the location that would command the largest possible market, thereby maximizing revenue. A more behavioral perspective was introduced by Allan Pred, who argued that location decisions are not perfectly rational but are made by individuals with imperfect information, leading to sub-optimal but satisfactory outcomes, a concept known as satisficing behavior. D. M. Smith synthesized these cost and revenue considerations in his model of spatial margins to profitability. Smith's framework identifies a geographical area within which a firm can operate profitably; outside these margins, the combination of costs and revenue would result in a loss. This approach acknowledges that there isn't a single optimal point but rather a zone of feasibility for industrial location.

Based on the above source, attempt the following five questions.

261. Which theorist is primarily associated with a maximum-profit, market-area approach to industrial location?
(A) Alfred Weber.
(B) Allan Pred.
(C) D. M. Smith.
(D) August Lösch.

262. The key distinction of Allan Pred's contribution to industrial location theory is its emphasis on:
(A) The singular importance of minimizing transportation costs.
(B) A behavioral approach involving imperfect information and satisficing decisions.
(C) The geometric precision of optimal market areas.
(D) The absolute dominance of labour costs over all other factors.

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263. According to the source, D. M. Smith's concept of "spatial margins to profitability" suggests that:
(A) There is only one single point where a factory can be profitable.
(B) Profitability is solely determined by transportation costs.
(C) There exists a geographical zone within which a firm can achieve profitability.
(D) Firms always make perfectly rational location decisions.

264. How does Alfred Weber's model primarily determine the optimal location for an industry?
(A) By maximizing the size of the potential market area.
(B) By analyzing the behavioral patterns of entrepreneurs.
(C) By finding a location within a broad zone of general profitability.
(D) By identifying the point of minimum aggregate costs, especially for transport.

265. A key difference between the approaches of Weber and Lösch is that:
(A) Weber focuses on costs, while Lösch focuses on revenue and market area.
(B) Weber considers labour costs, while Lösch completely ignores them.
(C) Lösch's model is a least-cost model, while Weber's is a maximum-profit model.
(D) Weber incorporates behavioral aspects, while Lösch's model is purely economic.

Direction : Please read the following source carefully.

The delineation of agricultural regions is a key task in agricultural geography, with various quantitative methods developed to provide objective classifications. Among the most

(D) 1, 3, and 4

237. The 'Potential Model' is a variant of the Gravity Model that calculates the:
(A) likelihood of a new road being built.
(B) potential for agricultural productivity.
(C) total interaction potential of one location with respect to all other locations in a system.
(D) breaking point between two market centers.

238. In D. M. Smith's 'Spatial Margins to Profitability' model, a location outside the margin is one where:
(A) profits are maximized.
(B) revenue equals costs.
(C) the firm has a monopoly.
(D) costs exceed revenues, resulting in a loss.

239. The most significant factor that has facilitated the recent phase of globalization is:
(A) the revolution in information and communication technology (ICT) and transportation.
(B) the decline in world population.
(C) a global trend towards protectionism.
(D) the depletion of all natural resources.

240. The demand for the creation of Telangana from Andhra Pradesh in India was a prominent example of a social movement driven by:
(A) the desire for international recognition.
(B) perceptions of regional neglect, underdevelopment, and inequitable resource distribution.
(C) a pure linguistic conflict with no economic basis.
(D) a need to promote a single specific industry.

241. A baker who bakes bread (a weight-gaining product) would ideally locate his bakery near the customers to minimize transport costs. This decision aligns with the principles of whose location theory?
(A) August Losch
(B) Alfred Weber
(C) Gunnar Myrdal
(D) John Friedman

242. The primary sector of the economy includes all of the following EXCEPT:
(A) Food processing
(B) Agriculture
(C) Mining
(D) Forestry

243. The "spatial organization of economic activities" refers to:
(A) the "what" of economic activity.
(B) the "why" of economic activity.
(C) the "where" of economic activity.
(D) the "when" of economic activity.

244. The main function of Land Use Planning is to:
(A) promote haphazard and uncontrolled urban sprawl.
(B) prevent any form of agricultural activity.
(C) sell land to the highest bidder without any regulation.
(D) ensure rational, orderly, and efficient use of land resources.

245. An industry that requires a large amount of electricity, like aluminum smelting, is often located near a source of cheap power. This is an example of what kind of orientation?
(A) Market-oriented
(B) Labor-oriented
(C) Power-oriented
(D) Raw material-oriented

246. Which theory explicitly deals with 'spread' and 'backwash' effects as mechanisms of regional inequality?
(A) Hirschman's Unbalanced Growth
(B) Myrdal's Cumulative Causation
(C) Friedman's Core-Periphery Model
(D) Weber's Industrial Location Theory

247. The primary purpose of the measures and indices of connectivity and accessibility is to:
(A) determine the political capital of a country.
(B) measure the total volume of trade.
(C) calculate the population of a region.
(D) quantify the structure and efficiency of transport networks.

248. The transition from GATT to WTO signified a shift towards:
(A) a formal, institution-based trade regulation system with a dispute settlement mechanism.

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(B) a more informal set of trade recommendations.
(C) a focus solely on agricultural trade.
(D) the abandonment of the most-favored-nation principle.

249. A major determinant of regional variations in agricultural productivity is:
(A) the dominant political party in the region.
(B) the average height of the farmers.
(C) the level of access to credit, technology, and market information.
(D) the number of languages spoken.

250. According to Allan Pred's behavioral approach, two entrepreneurs with the same information might choose different industrial locations because of:
(A) differences in their specific ability to use and interpret the information.
(B) unperceived variations in transportation costs across the geographical landscape.
(C) direct mandates issued by a central government planning authority.
(D) the universal application of the law of gravity to spatial interactions.

Direction : Please read the following source carefully.

The spatial organisation of economic activities is fundamentally shaped by a complex interplay of factors that vary across primary, secondary, tertiary, and quaternary sectors. Primary activities, such as agriculture and mining, are intrinsically tied to the geographical location of natural resources. Their spatial pattern is thus largely determined by geology, climate, and soil type. Secondary activities, which involve manufacturing and processing, exhibit greater locational flexibility. Their organisation is influenced by a combination of factors including proximity to raw materials, availability of skilled labour, access to markets, energy costs, and transportation infrastructure. Tertiary activities, comprising the service sector, are predominantly market-oriented, clustering in urban areas where population density ensures a sufficient consumer base. The rise of quaternary activities, focused on information processing, research, and management, introduces new locational dynamics. While traditionally concentrated in major metropolitan hubs with access to universities and a highly educated workforce, the advancement of communication technology has allowed for a degree of dispersal. Nevertheless, the need for face-to-face interaction and knowledge spillovers often reinforces their concentration in specific high-tech clusters and financial districts, demonstrating that even in the information age, geography continues to play a pivotal role in the organisation of economic life.

Based on the above source, attempt the following five questions.

251. Which economic sector's spatial organisation is described as being most intrinsically tied to the physical environment?
(A) The quaternary sector due to its reliance on high-tech infrastructure.
(B) The primary sector due to its dependence on natural resources.
(C) The tertiary sector due to its market orientation.
(D) The secondary sector due to its need for transportation networks.

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252. According to the source, what is the primary locational driver for tertiary economic activities?
(A) Access to a sufficient consumer base.
(B) Proximity to natural resource deposits.
(C) Availability of low-cost energy.
(D) Presence of major transportation hubs.

253. The source suggests that the spatial organisation of secondary activities is a result of:
(A) A singular focus on raw material location.
(B) An exclusive orientation towards market centres.
(C) A combination of multiple influencing factors.
(D) A complete dependence on communication technology.

254. What dual trend is identified in the locational dynamics of quaternary activities?
(A) A complete shift from urban to rural areas.
(B) A decline in developed nations and a rise in developing nations.
(C) A focus on both raw materials and market access equally.
(D) A simultaneous dispersal due to technology and concentration for knowledge spillovers.

255. Based on the passage, an inference can be made that with increasing economic complexity from primary to quaternary sectors, the locational flexibility of activities generally:
(A) Decreases.
(B) Remains static.
(C) Increases, but with certain centralising tendencies.
(D) Becomes solely dependent on government policy.

Direction : Please read the following source carefully.

The classification and management of natural resources are central to understanding economic geography and sustainability. Resources can be classified based on various criteria, including their origin (biotic/abiotic), exhaustibility (renewable/non-renewable), and stage of development (potential/actual/reserve). The distribution of these resources across the globe is highly uneven, leading to significant economic disparities and geopolitical tensions. For instance, the concentration of fossil fuels in specific regions has profound implications for global power dynamics. This uneven distribution is associated with numerous problems, including the "resource curse" where resource-rich countries may experience slower economic growth, and environmental degradation resulting from extraction activities. Consequently, Natural Resources Management has emerged as a critical field, focusing on the sustainable and equitable use of these assets. A major challenge in this domain is the World Energy Crisis, which manifests differently in developed and developing countries. Developed nations, with high per capita consumption, grapple with issues of supply security and transitioning to renewable sources. In contrast, developing countries often face a more fundamental crisis of energy access and affordability, where a lack of modern energy services impedes economic development and perpetuates poverty. Effective management must therefore address both global sustainability and regional development needs.

Based on the above source, attempt the following five questions.

256. According to the passage, what is a primary consequence of the uneven geographical distribution of natural resources?
(A) Uniform economic development worldwide.
(B) Economic disparities and geopolitical tensions.
(C) A global shift towards exclusively renewable energy.
(D) The complete elimination of the resource curse.

257. The source describes the "resource curse" as a phenomenon where:
(A) Countries with few resources experience rapid economic growth.
(B) All resource-rich countries successfully diversify their economies.
(C) Environmental degradation is completely avoided during resource extraction.
(D) Resource-rich countries may face challenges like slower economic development.

258. How does the World Energy Crisis differ between developed and developing countries, as described in the text?
(A) Developed countries focus on supply security, while developing countries struggle with basic energy access and affordability.
(B) Developed countries face a crisis of access, while developing countries face a crisis of overconsumption.
(C) Developing countries are primarily concerned with transitioning to renewables, while developed countries are not.
(D) The crisis is exclusively a problem for developed countries with high per capita consumption.

259. Based on the passage, Natural Resources Management is a field that primarily aims to:
(A) Maximize the rate of resource extraction for short-term profit.
(B) Focus solely on the discovery of new potential resources.
(C) Promote the sustainable and equitable use of resources.
(D) Encourage the complete preservation of all resources without use.

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282. According to the Von Thunen model, which type of agricultural activity would be located closest to the central market city?
(A) Intensive farming and dairying.
(B) Extensive livestock ranching.
(C) Less intensive crop farming.
(D) Large-scale forestry for timber export.

283. Which of the following is an explicit assumption of the Von Thunen model as described in the passage?
(A) Multiple competing market cities.
(B) Variable transportation costs unrelated to distance.
(C) A uniform plain with no topographical barriers.
(D) Farmers motivated by subsistence rather than profit.

284. Why is forestry located relatively close to the city in Von Thunen's model?
(A) Because trees are highly perishable.
(B) Because forestry requires the most fertile soil found near the city.
(C) Because it is less labor-intensive than ranching.
(D) Because wood is heavy and has high transport costs relative to its value.

285. The passage suggests that the primary reason a concentric zonation emerges is that:
(A) Different crops have different abilities to bear transport costs and pay for land.
(B) Farmers in different zones have different levels of skill.
(C) The central city's government dictates the land-use pattern.
(D) The climate changes systematically with distance from the city.

Direction : Please read the following source carefully.

The concept of the 'region' is fundamental to geography, and a key task is its classification. A primary distinction is made between formal and functional regions. A formal region is defined by the widespread presence of one or more common, and often measurable, characteristics, such as a specific climate type, language, or agricultural system. Its boundaries are drawn where the defining feature ceases to be dominant. In contrast, a functional region (referred to in some typologies as a fictional region in the sense of being a construct of flows) is defined not by homogeneity but by a system of interactions or movements that connect a central node (or hub) with its surrounding area (hinterland). Examples include the circulation area of a newspaper, a commuter watershed around a city, or the trade area of a major port. The boundaries of a functional region are marked by the diminishing intensity of the organizing flow or interaction. Understanding this typology is crucial for analyzing world regional disparities. Such disparities manifest as vast differences in economic well-being, technological advancement, and social development between different parts of the globe. These global divides can be conceptualized as a core-periphery structure, where core regions are dominant functional nodes in the global economy, while peripheral regions are characterized by weaker integration and economic dependency.

Based on the above source, attempt the following five questions.

286. Which of the following would be the best example of a formal region?
(A) The delivery area for a pizza restaurant.
(B) The area served by a major international airport.
(C) The network of cities connected by a high-speed rail line.
(D) A region where the majority of the population speaks French.

287. According to the passage, a functional region is primarily defined by:
(A) A uniform physical landscape.
(B) A shared cultural or political identity.
(C) A system of interactions organized around a central node.
(D) The absolute absence of any defining characteristic.

288. The boundary of a functional region is best described as the line where:
(A) The intensity of the organizing flow or interaction significantly decreases.
(B) A different language becomes dominant.
(C) The physical climate changes abruptly.
(D) An official political border is established.

NODIA

notable are the techniques for delineating crop combination regions proposed by Weaver, Doi, and Rafiullah. J.C. Weaver's method, a pioneering statistical approach, calculates the deviation of the actual percentage of crop area from a theoretical distribution. It identifies the combination that minimizes the sum of squared differences between the actual crop percentages and a hypothetical even distribution (e.g., 100% for one crop, 50% each for two crops, etc.), making it statistically robust but computationally intensive. To simplify this, Kazuko Doi modified Weaver's method by using the sum of squared differences of the crop percentages, which is easier to calculate while retaining statistical soundness. S. M. Rafiullah proposed yet another modification, aiming to improve upon Weaver's results, particularly for regions with a high number of crops. His method uses the maximum positive deviation, which compares the actual percentage distribution with a theoretical one based on a geometric progression. Each of these methods—Weaver's standard deviation technique, Doi's simplified sum of squares, and Rafiullah's maximum positive deviation—offers a distinct statistical pathway to objectively define and map the dominant agricultural character of a region.

Based on the above source, attempt the following five questions.

266. What was the primary objective of the methods developed by Weaver, Doi, and Rafiullah?
(A) To measure the determinants of agricultural productivity.
(B) To objectively delineate crop combination regions.
(C) To create a global system of agricultural classification.
(D) To model the ideal pattern of agricultural land use around a market.

267. According to the passage, how did Kazuko Doi modify J.C. Weaver's original method?
(A) By introducing a behavioral component into the calculation.
(B) By using the sum of squared differences, which simplified the computation.
(C) By focusing exclusively on the single most dominant crop.
(D) By applying a maximum positive deviation technique.

268. J.C. Weaver's method for delineating crop combination regions is described as being:
(A) Statistically robust but computationally intensive.
(B) A qualitative assessment based on farmer interviews.
(C) A simple ranking of crops by their total production value.
(D) The easiest and quickest method to apply manually.

269. Which theorist's method is identified in the text as using the "maximum positive deviation"?
(A) J.C. Weaver.
(B) Von Thunen.
(C) S.M. Rafiullah.
(D) Kazuko Doi.

270. Based on the source, a common feature of all three described methods is their:
(A) Identical computational procedure.
(B) Focus on agricultural productivity rather than crop area.
(C) Application primarily in industrial geography.
(D) Reliance on a statistical approach to define regions.

Direction : Please read the following source carefully.

Theories and models of spatial interaction are crucial for understanding the movement of people, goods, and information between places. Edward Ullman proposed a foundational framework identifying three essential bases for spatial interaction: complementarity, transferability, and intervening opportunity. Complementarity exists when one region has a surplus of a commodity that is demanded by another region. Transferability refers to the feasibility and cost of moving a good between these regions; if the cost of transport is too high, interaction will not occur despite existing complementarity. The third factor, intervening opportunity, suggests that interaction between two places is diminished if a closer, alternative source for the commodity exists. M. E. Hurst contributed to this field by developing and refining spatial flow models, which seek to mathematically represent and predict the volume of interaction.

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A prominent example is the Gravity Model, which posits that the interaction between two places is directly proportional to the product of their sizes (e.g., populations) and inversely proportional to the distance between them. Variants of the Gravity Model have been developed to incorporate different measures of distance (e.g., travel time, cost) and attractiveness, enhancing its predictive power for analyzing flows in transport and trade networks. These models are instrumental in measuring and indexing connectivity and accessibility within a spatial system.

Based on the above source, attempt the following five questions.

271. According to Edward Ullman's framework, what is 'transferability'?
(A) The existence of a supply in one region and a demand in another.
(B) The presence of a closer alternative source for a commodity.
(C) The feasibility and cost associated with moving a good between locations.
(D) The total volume of goods exchanged between two regions.

272. The Gravity Model of spatial interaction suggests that the flow between two centers will increase if:
(A) The distance between them increases.
(B) The sizes of both centers increase.
(C) An intervening opportunity emerges between them.
(D) The cost of transport becomes prohibitively high.

273. Which of Ullman's three bases for interaction explains why a city might trade with a more distant partner, B, instead of a closer partner, C, if C does not have the specific product the city needs?
(A) Transferability.
(B) Intervening Opportunity.
(C) Gravity Model.
(D) Complementarity.

274. The concept of an 'intervening opportunity' would predict that the interaction between City X and City Z will be reduced if:
(A) City Y, located between X and Z, begins to offer the same goods as Z.
(B) City X and City Z grow in population.
(C) The transport cost between X and Z decreases.
(D) The demand for goods in City X disappears completely.

275. The passage indicates that both Ullman's framework and the Gravity Model are primarily used for:
(A) Delineating formal and functional regions.
(B) Analyzing the movement and flow between places.
(C) Classifying different types of industrial activities.
(D) Measuring agricultural productivity.

Direction : Please read the following source carefully.

Regional development theories offer contrasting explanations for the persistence of spatial economic disparities. Gunnar Myrdal's theory of cumulative causation posits that regional inequalities are not self-correcting but tend to intensify over time. He argued that the growth of a prosperous region (the "core") attracts capital, skilled labor, and enterprise from less developed regions (the "periphery") through "backwash effects," thereby exacerbating disparities. While "spread effects," such as increased demand for peripheral goods, do exist, Myrdal believed they are typically weaker than backwash effects, especially in the early stages of development. In contrast, Albert O. Hirschman's theory of unbalanced growth suggests that development is inherently uneven. He argued for concentrating investment in key sectors to create "polarization effects," similar to Myrdal's backwash. However, Hirschman was more optimistic, positing that the growth of these core areas would eventually stimulate development in the periphery through "trickle-down effects." These effects would emerge as the core becomes congested or as its industries seek new markets and resources, thus spreading prosperity. While both theories acknowledge the initial polarization of growth, Myrdal's framework presents a more pessimistic outlook on the natural reduction of inequality compared to Hirschman's more hopeful view of eventual convergence through trickle-down mechanisms.

Based on the above source, attempt the following five questions.

NODIA

276. What is the central argument of Gunnar Myrdal's theory of cumulative causation?
(A) Regional disparities tend to worsen due to self-reinforcing growth in core areas.
(B) Regional inequalities naturally correct themselves over time.
(C) All regions develop at an equal and balanced rate.
(D) Spread effects are always stronger than backwash effects.

277. According to the source, Myrdal's "backwash effects" refer to the:
(A) Spread of economic prosperity from the core to the periphery.
(B) Balanced flow of resources between all regions.
(C) Government interventions designed to reduce regional inequality.
(D) Draining of capital, labor, and enterprise from the periphery to the core.

278. A key difference between the theories of Myrdal and Hirschman lies in their perspective on the long-term outcomes of polarized development. Hirschman is more optimistic due to his belief in:
(A) The overwhelming and permanent power of backwash effects.
(B) The eventual dominance of "trickle-down effects" stimulating the periphery.
(C) The necessity of a perfectly balanced growth strategy from the start.
(D) The inherent inability of core regions to sustain any growth.

279. Which term used by Albert O. Hirschman is conceptually similar to Gunnar Myrdal's "backwash effects"?
(A) Trickle-down effects.
(B) Spread effects.
(C) Polarization effects.
(D) Unbalanced growth.

280. Both Myrdal and Hirschman would agree on which of the following initial premises?
(A) Government intervention is always ineffective in guiding regional development.
(B) The periphery benefits more than the core in the early stages of development.
(C) All economic sectors should receive equal investment simultaneously.
(D) Economic development initially tends to be spatially concentrated and uneven.

NODIA

Direction : Please read the following source carefully.

The Von Thunen model of agricultural land use, developed in the early 19th century, remains a foundational concept in economic geography for its insights into land use planning. The model is built upon a set of simplifying assumptions, including an "isolated state" with a single central market city, surrounded by a featureless, uniform plain. Transportation costs are assumed to be directly proportional to distance from the market, and farmers are motivated by profit maximization. Based on these premises, Von Thunen predicted that a concentric pattern of agricultural activity would develop around the central city. The innermost ring would be dedicated to intensive farming and dairying, producing perishable and high-value goods that need to reach the market quickly. Subsequent rings, moving outward, would be occupied by activities with lower transport costs relative to their value, such as forestry for fuel and building materials, followed by less intensive crop farming, and finally, extensive livestock ranching in the outermost zone. The key determinant of this land-use pattern is the interplay between land rent, market price, production cost, and transport cost. The crop that can afford to pay the highest land rent at a given location will occupy that land, creating a predictable spatial zonation of agricultural systems.

Based on the above source, attempt the following five questions.

281. What is the central organizing principle that determines the land-use pattern in Von Thunen's model?
(A) The interplay between transport costs and land rent.
(B) The political boundaries of the isolated state.
(C) The cultural preferences of the farming population.
(D) The random distribution of soil fertility across the plain.

blocs can be a barrier to global free trade.
Reason (R) : While they reduce trade barriers internally, they may raise common external tariffs, discriminating against non-member countries.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

229. A geographer delineating a region based on the area served by a particular airport is defining a:
(A) formal region.
(B) fictional region.
(C) functional region.
(D) uniform region.

230. The primary determinant of land use in the Von Thunen model is:
(A) soil fertility, which varies significantly across the plain.
(B) land rent, which is a function of market price, production cost, and transport cost.
(C) government zoning regulations.
(D) cultural preferences for certain crops.

231. Consider the following statements regarding world industrial regions:
1. The Ruhr Valley in Germany is a classic old industrial region based on coal and steel.
2. 'Silicon Valley' in the USA is a modern high-technology industrial region.
3. The Kanto Plain in Japan is a major, diversified industrial hub.
4. Industrial regions are evenly distributed across all continents.

Which of the above statement(s) is/are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 3 and 4 only
(D) 1, 2, 3 and 4

232. 'Connectivity' and 'accessibility' are key concepts in which sub-discipline of geography?
(A) Geography of Transport and Trade
(B) Agricultural Geography
(C) Industrial Geography
(D) Regional Development

233. The 'backwash effects' described by Gunnar Myrdal lead to:
(A) increased regional convergence.
(B) the balanced growth of all regions.
(C) increased regional divergence and inequality.
(D) the diffusion of innovation to the periphery.

234. Given below are two statements:
Statement I : A key prospect of intra-regional trade is that it can stimulate economic growth by creating larger markets.
Statement II : A key problem of intra-regional trade, especially among developing nations, is that their economies are often competitive rather than complementary.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

235. The classification of an industry as 'heavy' or 'light' is typically based on:
(A) the total number of manual and clerical employees.
(B) the specific ownership of the company or corporation.
(C) the national origin of the primary raw material used.
(D) the weight of the raw materials and final product.

236. Consider the following statements regarding regional development:
1. A formal region is defined by homogeneity in one or more criteria.
2. A functional region is organized around a central node or focal point.
3. The "North-South" divide refers to the disparity between developed and developing countries.
4. Gunnar Myrdal's theory of cumulative causation suggests regional inequalities tend to decrease over time naturally.
5. Dependency theory views underdevelopment as an externally imposed condition.

Which of the above statement(s) is/are correct?
(A) 1, 2, 3, and 5
(B) 1, 2, 4, and 5
(C) 2, 3, and 4

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289. How does the passage connect the concept of region typology to world regional disparities?
(A) By stating that only formal regions experience economic disparities.
(B) By suggesting that functional regions are always wealthier than formal regions.
(C) By arguing that region classification is irrelevant to understanding global inequality.
(D) By framing global divides as a core-periphery structure of dominant and dependent functional regions.

290. What is the key difference between a formal and a functional region as outlined in the text?
(A) Formal regions are defined by homogeneity, while functional regions are defined by interaction.
(B) Formal regions are large, while functional regions are small.
(C) Formal regions are economic, while functional regions are cultural.
(D) Formal regions have clear boundaries, while functional regions have none.

Direction : Please read the following source carefully.

The contemporary global economy is profoundly shaped by the processes of globalisation and liberalisation, with the World Trade Organisation (WTO) playing a pivotal institutional role. Globalisation refers to the increasing interconnectedness of economies, cultures, and societies worldwide, driven by advancements in technology and reductions in barriers to movement. Liberalisation, a key component of this process, involves the removal or reduction of state-imposed restrictions on trade and investment, such as tariffs and quotas. The WTO facilitates this by establishing a framework of rules for international commerce and acting as a forum for negotiating trade agreements among its member countries. These forces have significantly altered World Trade Patterns, fostering complex global supply chains and increasing the volume of international trade. However, the outcomes are not uniform. While globalisation has spurred economic growth in some areas, it also poses challenges, leading to debates about its impact on national sovereignty, labour standards, and environmental protection. Problems and prospects of inter- and intra-regional cooperation and trade are central to this new landscape. While regional trade blocs can foster deeper integration among neighbours, they also risk creating trade diversion. The challenge lies in ensuring that regional cooperation complements, rather than conflicts with, the multilateral trading system promoted by the WTO.

Based on the above source, attempt the following five questions.

291. According to the passage, what is the primary function of the World Trade Organisation (WTO)?
(A) To directly manage global supply chains for multinational corporations.
(B) To impose trade restrictions and tariffs to protect national economies.
(C) To provide a rules-based framework and forum for negotiating international trade.
(D) To promote cultural exchange exclusively, without economic considerations.

292. Liberalisation, as a component of globalisation, is defined in the text as:
(A) The removal or reduction of state restrictions on trade and investment.
(B) The increase in cultural interconnectedness between nations.
(C) The technological advancements that facilitate communication.
(D) The formation of regional cooperative bodies and trade blocs.

NODIA

293. The passage suggests that a potential problem associated with regional trade blocs is that they might:
(A) Completely halt the process of globalisation.
(B) Eliminate the need for the World Trade Organisation.
(C) Only function effectively in the absence of liberalisation.
(D) Lead to "trade diversion" that could conflict with the multilateral system.

294. Which of the following is identified as a primary driver of globalisation?
(A) A global increase in subsistence agriculture.
(B) Technological advancements and reduced barriers to movement.
(C) The strengthening of national trade barriers.

(D) A decline in international investment flows.

295. What does the source imply about the impact of globalisation on World Trade Patterns?
(A) It has simplified trade by localizing all production.
(B) It has decreased the overall volume of international trade.
(C) It has created complex global supply chains and increased trade volumes.
(D) It has resulted in uniform economic growth across all nations.

Direction : Please read the following source carefully.

The contemporary economic landscape is increasingly characterized by the growth of knowledge-based industries, fundamentally altering global distribution patterns of economic activity. This shift is evident in the rapid expansion of the Information and Communication Technology (ICT) and Knowledge Production sectors, which encompass activities like higher education and Research & Development (R&D). Unlike traditional manufacturing, these quaternary industries are less tied to raw materials and more dependent on human capital, innovation ecosystems, and high-quality digital infrastructure. Consequently, their world distribution is highly concentrated, favoring metropolitan areas in developed countries and emerging innovation hubs that can attract and retain a highly skilled workforce. This creates a new geography of economic power based on information and innovation. Alongside these high-tech sectors, the tourism industry has also become a major global economic force. Though often classified as a tertiary service, its complex linkages with culture, environment, and infrastructure give it unique geographical characteristics. Its growth is driven by rising disposable incomes, increased leisure time, and improved transportation. The world distribution of tourism is also uneven, with destinations competing based on natural and cultural attractions, safety, and infrastructure, reflecting another dimension of global economic integration and competition.

Based on the above source, attempt the following five questions.

296. What is the primary locational requirement for the ICT and Knowledge Production industries mentioned in the passage?
(A) Proximity to raw material deposits.
(B) Access to low-cost, unskilled labour.
(C) Dependence on agricultural land.
(D) Availability of human capital and innovation ecosystems.

297. The passage describes the world distribution of ICT and R&D industries as being:
(A) Highly concentrated in specific metropolitan and innovation hubs.
(B) Evenly spread across all rural and urban areas.
(C) Primarily located in regions with low population density.
(D) Randomly distributed without any discernible pattern.

298. According to the text, which of the following is a key driver for the growth of the tourism industry?
(A) A global decline in disposable incomes.
(B) Increased leisure time and improved transportation.
(C) A shift towards localized, subsistence economies.
(D) The expansion of traditional manufacturing sectors.

299. How does the passage categorize the ICT and Knowledge Production sectors?
(A) As primary industries.
(B) As quaternary industries.
(C) As secondary industries.
(D) As traditional tertiary services.

300. A commonality in the world distribution of both the Knowledge Production and Tourism industries, as implied by the passage, is that they are both:
(A) Geographically uneven and competitive.
(B) Completely independent of infrastructure.
(C) Declining in economic importance.
(D) Exclusively found in developing countries.

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ANSWERS

1. (B) The direct extraction or harvesting of natural resources from the earth.
Primary economic activities involve the direct utilization of natural resources from the environment. These processes include activities such as agriculture, mining, forestry, and fishing, where raw materials are gathered directly from the earth's surface or interior. These tasks represent the most fundamental level of production and provide the essential materials required for subsequent industrial processing in the secondary sector and broader global economic development stages.

2. (A) Secondary
Secondary economic activities focus on the transformation of raw materials into finished or semi-finished goods through various manufacturing and industrial processes. Converting iron ore into steel is a classic example of this sector, as it involves significant value-addition using energy, machinery, and labor. This sector is vital for economic growth, as it produces tangible products that are more useful and valuable than their original components.

3. (C) Retail trade
The tertiary sector encompasses a broad range of services provided to both businesses and individual consumers instead of the production of physical goods. It facilitates the exchange and movement of commodities produced in other sectors. Activities like retail trade, banking, and transportation fall under this category. These services are essential for the functioning of modern urban economies and contribute significantly to employment and national income.

4. (D) Quaternary
Quaternary activities represent the knowledge-based part of the economy, focusing on information processing, research, and high-level management. Professionals in this sector, such as university professors engaged in advanced research, specialize in creating, analyzing, and disseminating complex data. This sector is distinct from basic services because it relies heavily on intellectual skills, innovation, and technological advancements to drive social and economic progress in highly developed nations.

5. (A) P-3, Q-1, R-4, S-2
Resource classification identifies materials based on their origin and availability in nature. Biotic resources, such as fisheries, originate from living organisms, while abiotic resources, like iron ore, come from non-living matter. Man-made resources involve the application of human technology to create tools. Ubiquitous resources, such as sunlight, are found everywhere on the planet. Understanding these distinctions is crucial for planning sustainable resource utilization and management.

6. (B) National language
The spatial organization of economic activities is primarily influenced by factors that impact production costs and market accessibility. Access to raw materials, availability of capital, and government policies are fundamental determinants that shape where industries and businesses locate. While culture is important, a national language is generally not considered a primary factor in the technical and economic decision-making process for the spatial distribution of activities.

NODIA

7. (D) Petroleum
Natural resources are classified as renewable or non-renewable based on their rate of replenishment. Petroleum is considered a non-renewable resource because it takes millions of years to form from organic matter under specific geological conditions. Once extracted and consumed, it cannot be replaced within a human timeframe. This finite nature presents significant challenges for global energy security and necessitates the development of sustainable energy alternatives.

8. (A) Both A and R are true and R is the correct explanation of A.
The world energy crisis creates a disproportionate burden on developing nations due to structural

Globalization has fundamentally changed manufacturing by encouraging companies to relocate production from developed nations to less developed countries. This shift is largely driven by the pursuit of lower production costs, particularly the availability of cheap labor. Additionally, many less developed nations have more lenient environmental regulations, which further reduces operating expenses for heavy industries. This process has led to a new international division of labor and significant economic shifts across the globe.

40. (A) It is a smokeless industry with significant economic linkages.
The tourism industry is often referred to as a smokeless industry because it generates significant economic activity without the heavy environmental pollution associated with traditional manufacturing. It provides services rather than tangible physical products and creates strong economic linkages with other sectors like transportation, hospitality, and retail. As a major source of foreign exchange and employment, tourism plays a vital role in the regional development of many countries with unique natural or cultural assets.

41. (C) balancing transportation costs against production costs.
E.M. Hoover's work in industrial location theory expanded upon earlier models by emphasizing the need to balance transportation costs with actual production costs. He recognized that the total cost of a product is not just about moving materials but also involves variations in expenses like rent and labor at different sites. This integrated approach allows for a more nuanced analysis of why certain industries prefer locations near markets while others stay close to raw materials.

42. (A) Information and Communication Technology
Information and Communication Technology, commonly known as ICT, is a critical driver of modern industrial geography. It encompasses the diverse range of technological tools and resources used to transmit, store, and process information. The rise of ICT has facilitated the growth of knowledge-based industries and allowed for the global fragmentation of production processes. By improving connectivity, ICT has reduced the importance of physical distance in many service-oriented and high-technology economic activities.

43. (D) information availability and the decision-maker's ability to use it.
Allan Pred's behavioral matrix focuses on the human element in industrial location decisions. He argued that entrepreneurs do not always have perfect knowledge and their choices are limited by the information available to them. Furthermore, their specific ability to process and act upon that information varies. This perspective acknowledges that industrial patterns are not just the result of mathematical optimization but are also shaped by the perceptions and capabilities of individual decision-makers.

44. (B) quaternary sector.
The growth of industries focused on knowledge production, research, and development is a hallmark of the rising quaternary sector. This part of the economy deals with information management and high-level intellectual activities rather than physical manufacturing or resource extraction. As societies become more advanced, the production and strategic use of knowledge become primary drivers of economic growth. This shift reflects the transition toward a post-industrial society where information technology and innovation are central.

45. (C) the creation of new jobs, but often with low wages and poor working conditions.
Globalization has significantly impacted the manufacturing sector in less developed countries by attracting foreign investment and creating numerous employment opportunities. However, these new jobs are often characterized by low wages and poor working conditions as companies seek to minimize costs. While this industrial growth can boost the national economy, it also raises important social and ethical concerns regarding labor rights and the quality of life for workers in these rapidly developing industrial zones.

46. (D) an agro-based industry.
Industries are often classified based on the type of raw materials they use for production. A cotton textile mill is categorized as an agro-based industry because it relies on agricultural

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16. (B) 2, 4 and 5
The world energy crisis is a complex issue driven by several interconnected factors beyond simple physical scarcity. Political instability in major oil-producing regions often disrupts global supply chains, while extreme price volatility creates economic uncertainty. These challenges highlight the urgent need for a global transition toward renewable energy sources. Developed nations remain vulnerable to these market fluctuations, emphasizing that energy security requires strategic planning and diversified power generation.

17. (B) J.C. Weaver
In agricultural geography, J.C. Weaver introduced a rigorous statistical method for delineating crop combination regions. His approach involves calculating the standard deviation of the differences between actual crop percentages and a theoretical standard. By identifying the combination with the minimum deviation, researchers can objectively determine the dominant crops in a specific area. This technique provides a scientific basis for analyzing agricultural patterns and land use diversity.

18. (A) To allocate land uses among various competing claims in a systematic and rational manner.
Land use planning is a strategic process aimed at organizing the physical environment to meet social, economic, and environmental goals. It seeks to resolve conflicts between competing interests, such as agriculture, industry, and urban housing. By using a rational and systematic approach, planners ensure that land is utilized efficiently while protecting natural resources. This practice promotes sustainable development and enhances the quality of life within a specific geographic region.

19. (C) the practice of increasing the variety of crops grown on a farm or in a region.
Crop diversification involves expanding the range of agricultural products grown within a specific area or farm. Instead of relying on a single crop, farmers cultivate multiple species to reduce the risk of total failure from pests or climate fluctuations. This practice enhances food security, improves soil fertility through varied nutrient requirements, and stabilizes farm income. It is a key strategy for making agricultural systems more resilient and sustainable.

NODIA

20. (D) Intensive dairying and market gardening
According to the classic model of agricultural land use, land value and transport costs determine the location of farming activities. Products that are highly perishable and expensive to transport, such as milk and fresh vegetables, must reach the market quickly to remain profitable. Therefore, intensive dairying and market gardening are situated in the innermost ring closest to the central city. This proximity minimizes travel time and prevents spoilage.

21. (C) 1, 4, 2, 3
The development of agricultural geography concepts followed a clear historical progression. Von Thunen proposed his model of land use in the early nineteenth century. Much later, the USDA developed the Land Capability Classification system to manage soil resources. In the mid-twentieth century, J.C. Weaver introduced his statistical crop combination method. Finally, the Green Revolution in India brought massive technological changes to farming practices during the late nineteen-sixties and seventies.

22. (B) Doi
Statistical methods are used to analyze crop distribution and specialization within agricultural regions. The specific formula involving the sum of squared differences between observed and theoretical percentages was central to the method proposed by the scholar Doi. This technique serves as a modification of earlier models, offering a simpler way to delineate combinations. It helps researchers identify the degree of crop diversification or concentration across different geographic landscapes and territories.

23. (D) The level of technological inputs like irrigation and fertilizers.
Agricultural productivity is significantly determined by the quality and quantity of technological inputs applied to the farming process. While environmental factors like soil and climate are important, the use of modern irrigation systems, chemical fertilizers, and high-yield seeds can dramatically increase output per unit of land. These advancements allow farmers to overcome natural limitations and achieve

higher efficiency, which is essential for meeting the growing global demand for food.

24. (A) disparities in land tenure systems and access to irrigation.
Significant variations in agricultural productivity within a region often stem from socio-economic and structural inequalities. Disparities in land tenure systems can limit farmers' ability to invest in their fields, while unequal access to critical infrastructure like irrigation prevents consistent crop yields. When technological and institutional resources are not distributed evenly, certain areas will naturally achieve higher outputs than others, leading to visible regional imbalances in the overall agricultural economy.

25. (B) P-4, Q-3, R-2, S-1
Different agricultural systems are defined by their unique methods and environmental contexts. Shifting cultivation utilizes slash-and-burn techniques in tropical forests, while extensive commercial grain farming is highly mechanized with low labor input. Mediterranean agriculture focuses on specialized crops like citrus fruits and grapes. Plantation agriculture involves large-scale monoculture of cash crops for export. These systems reflect how human societies adapt their farming practices to specific climatic and economic conditions worldwide.

26. (A) the maximum positive deviation.
Delineating crop combination regions requires precise statistical techniques to identify patterns of agricultural specialization. S.M. Rafiullah provided a significant modification to earlier methods by introducing the use of the maximum positive deviation. This approach aimed to simplify the complex calculations required by other models while maintaining a high degree of accuracy. It allows geographers to categorize agricultural land based on the most dominant and relevant crop combinations in a region.

27. (D) Increased risk of total crop failure due to pests or disease.
Crop diversification offers numerous benefits to agricultural systems, including improved soil health and more stable farm incomes. By growing a variety of plants, farmers can protect themselves against the complete loss of production, as different crops have varying levels of resistance to specific pests or diseases. This practice enhances food security and ecological resilience, making it the opposite of monoculture, which is highly vulnerable to widespread agricultural crises and failures.

28. (A) Both A and R are true and R is the correct explanation of A.
In the classic model of agricultural land use, the intensity of cultivation is directly related to the distance from the market. Transport costs per unit of product increase as a farm is located further away, which reduces the potential profit for intensive activities. Consequently, farmers further from the market adopt less intensive land uses that require lower transportation overhead. This economic logic creates distinct concentric rings of different agricultural activities around centers.

29. (C) It is solely determined by the amount of rainfall received.
Agricultural productivity is a complex measurement influenced by a wide variety of factors beyond simple environmental conditions. While rainfall is important, productivity is also determined by land quality, labor efficiency, and the application of technological inputs like seeds and fertilizers. It is usually expressed as output per unit of land or labor. Suggesting that it depends entirely on a single weather variable is incorrect, as human management plays a critical role.

30. (D) the combination of crops, livestock, technology, and socio-economic factors.
The classification of global agricultural systems is based on a comprehensive set of criteria that define how farming is practiced. This includes the specific types of crops and livestock raised, the level of technology used, and the underlying socio-economic structures, such as land ownership and market orientation. These integrated factors create distinct patterns of land use that vary across different regions, reflecting human adaptation to diverse environmental and economic conditions worldwide.

31. (C) 1, 2 and 3 only
Land Capability Classification is a vital system for grouping soils based on their potential for agricultural use and their physical limitations.

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Class I lands represent the best quality soil with very few restrictions, while Class VIII lands are completely unsuitable for commercial plant production. The system considers factors like climate and soil slope to determine the most sustainable land use. This classification helps in planning agricultural development while preventing environmental degradation and soil erosion.

32. (B) An industry that can be located at any site without being affected by transport costs or resources.
A footloose industry is characterized by its flexibility in choosing a location because it is not significantly tied to specific raw material sources or heavy transportation requirements. Such industries often produce high-value, lightweight products where the cost of moving components or finished goods is minimal compared to total production costs. This independence allows them to relocate easily based on other factors, such as labor availability, quality of life, or local government incentives.

33. (B) A steel plant whose products are sold nationwide
Basic industries are those that produce goods primarily for export outside the local region, bringing in external wealth and supporting the local economy. A large steel plant that sells its products to a nationwide market is a classic example of a basic industry. In contrast, non-basic industries provide services or goods for the local population. The presence of basic industries is a critical driver for regional growth and industrial development across larger territories.

34. (A) transport costs, labor costs, and agglomeration economies.
Alfred Weber's theory of industrial location identifies three primary factors that determine where a factory should be situated. These include transportation costs for raw materials and finished goods, the cost of labor, and the benefits of agglomeration, where industries cluster together to share infrastructure. By analyzing these variables, an entrepreneur can find the least-cost location that maximizes efficiency. This model provides a foundational framework for understanding the spatial distribution of manufacturing.

35. (C) total transport cost.
In industrial location theory, an isodapane is a line connecting points that have the same total transportation costs. This concept is used to analyze how an industry might move away from the least-transport-cost site to take advantage of cheaper labor or agglomeration benefits elsewhere. If the savings in labor costs exceed the increase in transport costs represented by the isodapane, a relocation becomes economically rational. This helps explain complex patterns of industrial distribution.

36. (C) 1, 2, and 3
August Losch's theory of industrial location is built upon several key assumptions that simplify spatial economic analysis. He envisioned an isotropic plain where resources and transport routes are uniform in all directions. The model also assumes a large population of farmers with identical tastes and a primary focus on maximizing profit for the producer. These assumptions allow for the mathematical modeling of market areas and the determination of optimal sites for manufacturing and retail activities.

37. (C) the 'spatial margins to profitability'.
D.M. Smith's theory introduced the concept of spatial margins to profitability, which identifies the geographic area where a business can operate without making a loss. Within these margins, total revenue exceeds total costs, allowing for various potential locations rather than a single optimal point. This approach acknowledges that while one site might be the most profitable, several others are still viable. It provides a more flexible and realistic understanding of industrial location patterns.

38. (B) The industrial heartland of Germany
The Ruhr Valley is a historically significant industrial region located in western Germany. It became the country's industrial heartland due to its vast coal deposits and excellent access to water transportation via the Rhine River. For decades, it was a global center for coal mining and steel production, attracting a dense concentration of heavy industries. While the region has diversified into modern sectors, it remains a classic example of a resource-based industrial cluster.

39. (A) Both Statement I and Statement II are true.

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economic weaknesses. These countries often lack the necessary domestic capital and advanced technology to exploit their own natural energy reserves effectively. Consequently, they become heavily dependent on expensive imported fossil fuels. Rising global prices and supply disruptions further strain their limited financial resources, hindering overall industrial growth and societal development.

9. (C) The efficient and sustainable use of resources for long-term benefit.
Resource management involves the strategic planning and controlled utilization of natural assets to ensure they remain available for future generations. This concept moves beyond rapid exploitation or total preservation, seeking a balance through efficient practices. By implementing sustainable methods, societies can fulfill current economic needs while minimizing environmental degradation. It emphasizes the rational allocation of resources to support long-term ecological stability and human well-being.

10. (A) concentration in a few politically sensitive regions.
Petroleum reserves are distributed very unevenly across the globe, with a massive concentration located in specific geographic areas like the Middle East. This clustering often occurs in regions prone to political instability or geopolitical tension, which significantly impacts global energy security. The heavy reliance of the world economy on these limited locations makes the supply chain vulnerable to international conflicts, price volatility, and trade disruptions.

11. (C) 1, 2, and 4 only
Quaternary activities are knowledge-based and focus on information, research, and high-level decision making. These professions are often referred to as gold collar jobs due to the specialized skills and expertise required. They include policy formulation and advanced scientific research. Unlike primary activities, which involve the extraction of raw materials, the quaternary sector is centered on intellectual capital and innovation, driving modern economic development and complex institutional management.

12. (B) The tragedy of the commons, leading to overexploitation.
Common property resources, such as international fisheries, are often subject to the tragedy of the commons. This occurs when individual actors, acting in their own self-interest, deplete a shared resource despite knowing that its exhaustion is harmful to the group. Without enforceable international regulations or collective management, the lack of private ownership leads to overharvesting. This process eventually threatens the ecological balance and long-term sustainability of marine ecosystems.

13. (C) economic development.
Economic development is typically marked by a structural shift in a country's workforce across different sectors. As a nation progresses, labor moves from primary activities like agriculture into secondary manufacturing and eventually into tertiary services. This transition reflects technological advancement, higher productivity, and increased urbanization. Such shifts indicate a maturing economy where wealth is increasingly generated through specialized services and knowledge-based activities rather than basic resource extraction.

NODIA

14. (D) Statement I is false, but Statement II is true.
Developed countries have transitioned away from a reliance on the primary sector, which is now more dominant in the economies of developing nations. In highly advanced economies, tertiary and quaternary activities, such as finance, healthcare, and research, form the core of economic output. These sectors provide high value-added services and drive innovation, reflecting a post-industrial stage where intellectual capital and service provision outweigh traditional manufacturing.

15. (A) The inherent physical characteristics and limitations of the land for agricultural use.
Land Capability Classification is a systematic method for grouping different soil types based on their potential for sustained agricultural production. It evaluates inherent physical traits, such as soil texture, slope, and drainage, alongside environmental limitations like erosion risk. By assessing these characteristics, land managers can determine the most appropriate use for a specific area while preventing long-term degradation and ensuring that farming remains ecologically viable.

products, specifically cotton fibers, as its primary input. Other classifications include mineral-based, forest-based, or marine-based industries, depending on whether they process minerals, timber, or sea resources. Identifying these linkages helps in understanding the spatial relationship between industrial locations and the sources of their raw materials.

47. (A) Agglomeration
Agglomeration refers to the tendency of firms within the same or related industries to cluster together in a specific geographic area. This concentration allows businesses to benefit from shared infrastructure, a specialized labor pool, and the proximity of suppliers. These external economies of scale reduce individual production costs and foster innovation through the exchange of ideas. Agglomeration is a primary driver in the formation of major industrial regions and urban centers throughout the world.

48. (B) maximizing market area and profit.
August Losch's theory of location is distinct from earlier models because it prioritizes profit maximization over simple cost minimization. While other theorists focused on finding the least-cost site, Losch emphasized the importance of controlling the largest possible market area to increase total revenue. His approach uses demand cones to illustrate how the volume of sales decreases with distance. This perspective provides a deeper understanding of the spatial competition between firms in a market economy.

49. (B) The Amazon Rainforest
Major world industrial regions are characterized by dense concentrations of manufacturing activities, infrastructure, and urban centers. Regions like Western Europe, North-Eastern North America, and Eastern Asia are global leaders in industrial output. In contrast, the Amazon Rainforest is characterized by its vast biodiversity and primary resource extraction rather than large-scale industrialization. While it contains some localized economic activities, it does not rank among the major industrial heartlands that drive the global manufacturing economy.

50. (B) P-3, Q-4, R-2, S-1
Industrial location theories have been developed by several key scholars, each introducing unique concepts. Alfred Weber is known for the material index, which relates raw material weight to final product weight. August Losch focused on market area and profit maximization using demand cones. D.M. Smith introduced the spatial margins to profitability, while Allan Pred emphasized the human element through his behavioral matrix. Together, these theories provide a comprehensive framework for analyzing industrial geography.

51. (C) Complementarity, Transferability, and Intervening Opportunity
Edward Ullman proposed three essential conditions that facilitate spatial interaction between different locations. Complementarity requires a supply in one place and a corresponding demand in another. Transferability involves the feasibility of moving goods or people considering distance and costs. Intervening opportunity refers to the presence of a closer alternative that might divert the flow. These three factors provide a comprehensive framework for understanding the movement of commodities, information, and populations across geographic space.

52. (D) The presence of a supply in one place and a demand in another.
In the context of spatial interaction models, complementarity is the most basic requirement for movement to occur. It refers to a situation where one location has a surplus of a specific good or service, while another location has a deficit or demand for it. Without this mutual relationship, there is no economic reason for trade or interaction. Complementarity provides the underlying motivation for the spatial flow of resources and products between regions.

53. (A) Both A and R are true and R is the correct explanation of A.
The Gravity Model is a fundamental tool in geography used to predict the level of interaction between two places. It suggests that the volume of interaction is directly proportional to the product of their sizes, such as population or economic output. Larger places exert a greater pull or attraction because they offer more opportunities and services. This mass effect is a primary driver of spatial flows, explaining why large cities interact more intensely with each other.

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54. (B) the cost of overcoming distance.
Transferability is a key concept in spatial interaction that evaluates the ease with which a good, person, or piece of information can be moved from one point to another. It is primarily concerned with the costs and physical barriers associated with overcoming distance. If the transport costs are too high relative to the value of the product, transferability is low, and interaction will be limited. Advances in technology generally increase transferability by reducing transportation expenses.

55. (D) Intervening Opportunity
Intervening opportunity occurs when an alternative source of supply or a closer destination becomes available between an origin and a distant target. If city B can satisfy the demands of city A, the interaction that would have occurred between city A and the further city C is reduced or eliminated. This concept explains why people often choose closer facilities even if a more distant one is slightly better. It is a critical factor in determining spatial flow patterns.

56. (C) 1, 2, 3 and 4
Measuring network connectivity is essential for understanding the efficiency of transport systems. The Beta Index relates the number of links to nodes, with higher values indicating better connectivity. The Alpha Index compares actual circuits to the maximum possible number of circuits, providing a measure of network redundancy. An Alpha Index of zero signifies a network with no closed loops or circuits. These metrics allow geographers to objectively analyze and compare the development of different transportation infrastructures.

57. (C) supervise and liberalize international trade.
The World Trade Organisation is an international body established to supervise and liberalize global trade. Its primary goal is to ensure that trade flows as smoothly, predictably, and freely as possible. The organization provides a forum for negotiating trade agreements and offers a legal framework for resolving disputes between member nations. By reducing tariffs and other barriers, the WTO aims to promote global economic growth and integrate developing countries into the world trading system.

58. (A) behavioral and cognitive dimension.
M.E. Hurst's model of spatial interaction represents a significant extension of earlier theories by introducing a behavioral and cognitive dimension. He argued that human movement is not solely determined by economic rationality or physical distance but is also shaped by individual perceptions and knowledge. By considering how people perceive their environment and the choices available to them, Hurst provided a more realistic and nuanced understanding of the factors that influence spatial interaction and travel behavior.

59. (D) the distance between them increases.
The Gravity Model predicts that the intensity of interaction between two locations is inversely related to the distance between them. As the distance increases, the costs and time associated with movement also rise, which tends to reduce the frequency and volume of flows. This phenomenon is known as distance decay. While larger populations and better technology can enhance interaction, physical separation remains a significant barrier that naturally diminishes the relationship between distant geographic points in a system.

60. (B) the ease with which a location can be reached from other locations.
Accessibility is a central concept in transport geography that describes how easily a specific location can be reached from other points within a network. It is not just about physical distance but involves the quality and quantity of transport links available. Highly accessible places are well-connected and serve as major hubs for movement and economic activity. Improving accessibility is a primary goal of infrastructure development, as it enhances regional connectivity and supports broader social and economic integration.

61. (C) 1, 3, and 4
Globalization is a multifaceted process characterized by increasing interconnectedness across economic, cultural, and political spheres. It is facilitated by rapid advancements in communication and transportation technologies, which have reduced the barriers of time and space. As global links strengthen, the traditional importance of national borders and state sovereignty has seen a noticeable reduction.

NODIA

However, the benefits of this process are not distributed uniformly, often leading to increased disparities between different regions and nations around the world.

62. (D) the removal or reduction of restrictions or barriers on the free exchange of goods.
Liberalisation in international trade refers to the deliberate process of removing or reducing government-imposed restrictions on the exchange of goods and services between countries. This includes lowering tariffs, eliminating quotas, and simplifying customs procedures. The goal is to encourage free trade, increase competition, and allow countries to benefit from their comparative advantages. Liberalisation is a key component of the global economic integration promoted by international organizations like the World Trade Organisation to foster worldwide growth.

63. (A) The economies are often competitive rather than complementary.
Intra-regional trade in many developing regions faces a significant hurdle because the member countries often have similar economic structures. Instead of having complementary economies where one provides what the other lacks, they frequently produce the same primary commodities or low-tech manufactured goods. This competitive nature limits the opportunities for mutual exchange within the region. Consequently, these countries often find it more beneficial to trade with developed nations that have different resource endowments and industrial capabilities.

64. (A) Both Statement I and Statement II are true.
Regional trade blocs, such as the European Union or NAFTA, are prominent examples of inter-regional cooperation designed to enhance economic integration. These blocs aim to stimulate trade among member countries by reducing internal barriers like tariffs and quotas. At the same time, they often maintain common external tariffs or trade policies when dealing with non-member nations. Such agreements help member states achieve economies of scale and increase their collective bargaining power in the highly competitive global marketplace.

65. (B) Breaking-Point Model.
The Breaking-Point Model is a variation of the Gravity Model used to determine the boundary between the market areas of two competing cities. It accounts for the fact that consumers are often willing to travel longer distances for more specialized or higher-order goods that are not available locally. By identifying the point where a person is equally likely to visit either city, this model helps in delineating functional regions and understanding the hierarchical structure of retail and service centers.

66. (A) 2, 4, 3, 1
The history of international trade regulation has seen several key milestones. The General Agreement on Tariffs and Trade was signed shortly after World War II to promote free trade. Later, the European Economic Community was formed to integrate European markets. The Uruguay Round of negotiations began in the mid-nineteen-eighties, leading to significant reforms in global trade rules. Finally, these developments culminated in the establishment of the World Trade Organisation in nineteen-ninety-five, creating a formal institutional framework for trade.

67. (C) a country must grant its most favourable trading terms to all WTO members.
The Most-Favoured-Nation principle is a cornerstone of the World Trade Organisation's rules, designed to prevent discrimination between trading partners. Under this rule, if a country grants a special favor or lower tariff to one member, it must immediately and unconditionally extend that same treatment to all other WTO members. This ensures a level playing field and prevents the formation of exclusive trade arrangements that could disadvantage other nations, thereby promoting a more open and equitable global trading system.

68. (D) Greater economic efficiency and growth through specialization.
Enhancing inter-regional cooperation and trade offers significant prospects for global economic growth. By reducing barriers, countries can focus on producing goods and services where they have a comparative advantage, leading to greater overall efficiency. Specialization allows for economies of scale and encourages innovation through increased competition and knowledge sharing.

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This cooperation also fosters stronger diplomatic ties and cultural exchange, potentially leading to a more stable and prosperous international community with improved living standards for participating regions.

69. (C) Beta Index considers nodes and edges, while Gamma compares actual to potential edges.
Transport geographers use various indices to quantify the connectivity of a network. The Beta Index is a simple ratio that relates the number of edges to the number of nodes, providing a basic measure of network complexity. In contrast, the Gamma Index is more comprehensive, as it compares the actual number of edges to the maximum possible number of edges that could exist within that network. Together, these metrics help researchers analyze the efficiency and developmental stage of transportation infrastructure.

70. (B) A specific tax levied on each ton of imported steel.
Non-tariff barriers are trade restrictions that do not involve direct taxes or duties. Examples include quotas, complex customs procedures, and unique safety or technical standards that make it difficult for foreign goods to enter a market. However, a specific tax levied on an imported product is considered a tariff. Understanding the distinction between tariffs and non-tariff barriers is crucial for analyzing modern trade policy, as countries often use these subtle regulations to protect domestic industries while officially following free-trade agreements.

71. (D) The level of interaction between places decreases as the distance between them increases.
The concept of distance decay is fundamental to understanding spatial flows in geography. it signifies that the level of interaction, whether it involves trade, travel, or communication, tends to decrease as the physical distance between two locations increases. This occurs because the time, effort, and financial costs of overcoming distance act as a deterrent. While modern technology has mitigated this effect for information, physical movement remains heavily influenced by the natural barriers imposed by geographical separation.

72. (A) The General Agreement on Tariffs and Trade (GATT).
The World Trade Organisation was established in nineteen-ninety-five as the successor to the General Agreement on Tariffs and Trade. While GATT was a set of rules and a multilateral agreement with no formal institutional structure, the WTO is a permanent international body with significant power to enforce trade rules. It expanded the scope of international trade regulation to include services and intellectual property, providing a more robust and comprehensive framework for managing the complexities of the modern global economy.

73. (C) travel decisions are based on the perceived, rather than the actual, environment.
M.E. Hurst introduced a behavioral perspective to spatial interaction, arguing that human decisions are not always based on objective facts. Instead, individuals make travel and trade choices based on their personal perceptions of the environment, which may be incomplete or biased. This cognitive dimension accounts for the fact that people might ignore closer options if they perceive them as less desirable or are unaware of them. This approach provides a more realistic understanding of how individual behavior shapes spatial patterns.

NODIA

74. (A) Formal Region
A formal region is a geographic area defined by a high degree of homogeneity based on one or more specific characteristics. These criteria can be physical, such as a common climate or soil type, or cultural, such as a shared language or religion. Within a formal region, the defining feature is present throughout the entire territory. This concept allows geographers to categorize the world into distinct, uniform units, facilitating the study of spatial patterns and regional variations.

75. (B) P-3, Q-2, R-1, S-4
Regional development theories have been shaped by several key scholars with distinct perspectives. Gunnar Myrdal introduced the concept of cumulative causation to explain growing inequalities. Albert O. Hirschman advocated for unbalanced growth and the importance of linkages between sectors. John Friedman developed the core-periphery model to describe the stages of regional integration. Andre

Gunder Frank's dependency theory focused on how the development of core nations leads to the underdevelopment of the periphery. These theories provide a framework for analyzing spatial disparities.

76. (B) a set of interactions or movements focused on a central node or hub.
A functional or nodal region is defined by a system of interactions and connections that are organized around a central focal point. This node serves as a hub for activities such as commuting, retail trade, or information flow within the surrounding area. Unlike formal regions, the boundaries of a functional region are determined by the reach of these specific interactions. Common examples include the circulation area of a newspaper or the hinterland served by a major metropolitan center.

77. (C) Middle Earth from 'The Lord of the Rings'.
Fictional regions are geographic areas that exist only in literature, film, or mythology and have no basis in the real physical world. Middle Earth, the setting for 'The Lord of the Rings', is a classic example of such a region. While geographers primarily study real spaces, the concept of fictional regions is useful for exploring how humans perceive and imagine space. These imaginary locations often have detailed maps and internal logic, reflecting the creative power of human spatial thinking.

78. (A) Both A and R are true and R is the correct explanation of A.
Gunnar Myrdal's theory of cumulative causation posits that regional inequalities do not naturally disappear but instead tend to intensify over time. This happens because the core regions attract capital, skilled labor, and resources from the periphery, a process known as backwash effects. While some growth may diffuse back to the periphery through spread effects, these are usually much weaker. Consequently, the core becomes increasingly wealthy at the expense of the periphery, leading to persistent and growing spatial disparities.

79. (A) a strategy of unbalanced growth focusing on key sectors.
Albert O. Hirschman argued that developing countries lack the resources to promote balanced growth across all economic sectors simultaneously. Instead, he advocated for a strategy of unbalanced growth, where investment is concentrated in a few key sectors with strong linkages. These leading sectors then create incentives and pressure for development in other parts of the economy. This deliberate creation of imbalances is seen as a way to trigger a chain reaction of investment and growth throughout the national system.

80. (B) forward linkages.
In regional development theory, forward linkages occur when the output of one industry becomes the input for another subsequent stage of production. For example, a steel plant has forward linkages to the automobile and construction industries. By producing essential materials, such an industry stimulates the growth of other businesses that utilize its products. Hirschman emphasized that identifying and investing in sectors with strong forward and backward linkages is a critical strategy for promoting industrialization and overall economic growth.

81. (A) 1 and 2 only
Dependency theory suggests that the underdevelopment of certain nations is not a natural state but a direct result of their historical and economic relationship with more developed core nations. This perspective argues that the global capitalist system is structured in a way that allows the core to exploit the resources and labor of the periphery. As the core develops, it does so at the expense of the periphery, creating a cycle of structural inequality that is difficult to break through traditional trade.

82. (A) Four
John Friedman's core-periphery model describes the evolution of regional development through four distinct stages. It begins with a pre-industrial society of isolated centers and moves toward the emergence of a dominant core. The third stage involves the development of regional sub-centers, while the final stage represents a fully integrated national space economy. This model provides a framework for understanding how spatial inequalities are created and potentially reduced as a country progresses through different levels of industrialization and integration.

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83. (C) The European Union (EU)
A global economic bloc is a group of countries that have signed agreements to integrate their economies and reduce trade barriers among themselves. The European Union is the most advanced example, having created a single market with free movement of goods, services, and people. These blocs aim to increase the collective economic power of member states and promote regional stability. By coordinating policies, they can compete more effectively in the global market and achieve economies of scale for their industries.

84. (D) the diffusion of growth and innovation from the core to the periphery.
In Gunnar Myrdal's theory of cumulative causation, spread effects refer to the positive impacts that the growth of a core region can have on the surrounding periphery. This includes increased demand for raw materials and agricultural products from the periphery, as well as the diffusion of new technologies and innovations. While backwash effects tend to increase inequality, spread effects can promote development in poorer regions. The balance between these two forces determines the overall level of regional disparity in a country.

85. (C) a classification system for different types of regions.
A typology of regions in geography refers to the systematic classification of different types of geographic areas based on specific criteria. This includes categories such as formal regions, defined by uniformity; functional regions, defined by interactions; and perceptual regions, based on human attitudes. Creating a typology allows geographers to organize spatial information and analyze different regional processes more effectively. It provides a common language and framework for comparing disparate areas and understanding the complex organization of the earth's surface.

86. (B) 1, 2, 3, 4, and 5
Functional or nodal regions are geographic areas defined by a set of interactions and movements that are organized around a central focal point. They are characterized by activities such as commuting or information flow, which create fluid and non-uniform boundaries. The circulation area of a daily newspaper is a classic example of this regional type. Understanding functional regions is essential for urban planning and analyzing how central nodes influence the surrounding territory through various social and economic linkages.

87. (D) The Global North (developed countries) and the Global South (developing countries).
World regional disparities are most starkly visible in the socio-economic gap between the Global North and the Global South. This divide highlights the unequal distribution of wealth, technology, and health outcomes between industrialized nations and those that are still developing. Historical processes such as colonialism and the structure of the global economy have contributed to these persistent inequalities. Addressing these disparities is a major focus of international development efforts, aiming to promote more equitable growth and improve living standards globally.

88. (A) a direct consequence of their integration into the capitalist world system in a subordinate position.
The central argument of dependency theory is that the poverty of developing nations is not due to internal failings but is a result of their subordinate role in the global economy. This perspective posits that the international trade system is designed to benefit wealthy core nations by extracting cheap resources and labor from the periphery. This structural relationship creates a cycle of dependence where the periphery remains underdeveloped while the core accumulates wealth, making true economic independence difficult to achieve.

89. (C) the creation of a new state for better governance and resource allocation.
In India, social movements focused on regional development often arise from perceptions of neglect and underdevelopment within a specific area. These movements typically demand the creation of a new state to ensure better local governance and a more equitable allocation of resources. Proponents argue that smaller administrative units can more effectively address the unique needs of the local population and promote balanced growth. Such demands reflect the complex interplay between geographic

NODIA

identity, economic aspirations, and political representation in a large nation.

90. (A) Regional inequalities are significantly reduced and a balanced national space economy emerges.
In the final stage of John Friedman's core-periphery model, the national space economy becomes a fully integrated and interdependent system of cities. In this stage, the extreme dominance of a single core is reduced as regional sub-centers grow and connect with one another. This leads to a more balanced distribution of wealth, infrastructure, and opportunities across the entire country. The result is a reduction in regional inequalities and the emergence of a mature, functionally integrated national territory that supports sustainable economic development.

91. (D) Gunnar Myrdal
The concept of backwash effects is a central component of Gunnar Myrdal's theory of cumulative causation. It refers to the process by which a growing core region attracts capital, resources, and the most talented labor from the surrounding periphery. This outflow further weakens the peripheral regions, leading to a self-reinforcing cycle of decline and increasing regional inequality. Myrdal used this concept to explain why economic growth is often concentrated in a few locations while other areas remain underdeveloped despite their proximity to the core.

92. (B) Unbalanced Growth.
The theory of unbalanced growth suggests that a country can best promote development by concentrating its limited investment in a few strategically important sectors. These leading sectors, through their linkages with the rest of the economy, will eventually pull other industries forward. This approach, advocated by Albert O. Hirschman, stands in contrast to the idea of spreading resources thinly across all areas. By creating deliberate imbalances, the theory aims to trigger a series of investments and innovations that lead to overall economic progress.

93. (C) Metaphysical
Geographers use a standard typology to classify different types of regions based on measurable criteria. This includes formal regions, defined by uniformity; functional regions, based on interaction; and perceptual regions, based on human attitudes. However, a metaphysical region is not a recognized category in geography, as it does not relate to physical or observable social space. Understanding the standard regional typology is essential for systematic spatial analysis and for organizing geographical data in a way that reflects real-world patterns.

NODIA

94. (D) world regional disparities.
Significant disparities in income, healthcare, and education across different parts of the world are collectively referred to as world regional disparities. These inequalities highlight the massive gap in quality of life between the developed and developing worlds. Factors such as historical legacies, unequal trade patterns, and varying access to technology all contribute to these persistent imbalances. Analyzing these disparities is crucial for understanding global development trends and for creating international policies aimed at reducing poverty and promoting social justice.

95. (C) Statement I is true, but Statement II is false.
Social movements in India, such as the demands for new states like Gorkhaland or Telangana, are frequently rooted in deep-seated perceptions of regional neglect and economic underdevelopment. While linguistic and cultural identities often play a significant role in mobilizing people, these movements also have a strong economic component. Proponents argue that their regions have been denied a fair share of resources and opportunities. Therefore, it is incorrect to suggest that these movements are driven exclusively by linguistic differences without any underlying economic motivations.

96. (B) Friedman - Core-Periphery
Regional development theories are associated with specific scholars who introduced key concepts to the field. John Friedman developed the core-periphery model to describe the stages of spatial integration in a national economy. In contrast, Gunnar Myrdal is known for the theory of cumulative causation and spread and backwash effects. Albert O. Hirschman advocated for the strategy of unbalanced growth and linkages. Correctly pairing these theorists with their ideas

Linkages describe the relationships between different stages of production in an industrial system. A backward linkage occurs when a firm creates demand for products from an earlier stage of the supply chain. In the case of an automobile manufacturing plant, a steel mill that provides the necessary sheet metal is a classic example of a backward linkage. By stimulating demand for raw materials and components, the car plant supports the growth and development of its suppliers, contributing to broader industrial growth.

111. (A) 1 and 3
Regional development theories provide diverse perspectives on spatial inequality. Gunnar Myrdal's theory of cumulative causation uses spread and backwash effects to explain how core regions often grow at the expense of the periphery. John Friedman's model describes regional development as a progression through four distinct stages of spatial integration. These theories acknowledge that development is often an uneven process. In contrast, dependency theory focuses on external exploitation, and balanced growth models suggest that investment should be spread across all sectors, which some theorists dispute.

112. (B) a world industrial region.
The Great Lakes-St. Lawrence region in North America is one of the world's most prominent industrial heartlands. It became a major manufacturing hub due to its vast natural resources, particularly iron ore and coal, and its excellent water-based transportation network. The region is home to a dense concentration of heavy industries, including automobile manufacturing and steel production. As a center of economic activity and innovation, it exemplifies the characteristics of a mature and highly developed industrial region that drives national and global economies.

113. (B) leveraging comparative advantages for mutual economic gain.
A key prospect for inter-regional trade cooperation lies in the ability of different regions to leverage their comparative advantages. By specializing in the production of goods and services where they are most efficient, regions can engage in mutually beneficial exchange. This cooperation allows for a more rational allocation of resources, increases competition, and promotes innovation. By reducing trade barriers and fostering collaboration, regions can achieve higher levels of economic growth and provide a wider variety of goods to their populations at lower costs.

114. (D) Statement I is false, but Statement II is true.
The Gravity Model is a valuable tool in geography, but it is not a deterministic model that can perfectly predict all spatial interactions. While it provides a good probabilistic estimate based on size and distance, real-world flows are influenced by many other factors not included in the basic formula, such as cultural ties, political barriers, and individual perceptions. Therefore, the model should be viewed as a useful framework for understanding general patterns of interaction rather than a perfect predictor of every specific movement.

115. (C) assumes entrepreneurs are perfect "economic men" who always seek to minimize costs, ignoring other motivations.
A major critique of Alfred Weber's least-cost theory is its reliance on the assumption that entrepreneurs act as perfect economic men with complete information. In reality, business decisions are often influenced by a wide range of non-economic factors, such as personal preferences, social ties, and political considerations. Additionally, entrepreneurs may prioritize market share or innovation over simple cost minimization. This behavioral perspective highlights the limitations of purely economic models in explaining the complex and often unpredictable patterns of industrial location in the real world.

116. (D) 3, 2, 4, 1
The theories of industrial location have evolved significantly over time. Alfred Weber's pioneering least-cost approach was published in the early twentieth century. Later, August Losch introduced his profit-maximization model in the mid-twentieth century, shifting the focus to market areas. In the nineteen-sixties, Allan Pred added a behavioral dimension to location decisions through his behavioral matrix. Finally, D.M. Smith's concept of spatial margins to profitability gained prominence in the early nineteen-seventies, providing a more flexible

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such as accommodation, transportation, and entertainment, which brings external wealth into the local economy. This process has the same economic effect as exporting physical products, as it earns foreign currency and supports national income. Therefore, tourism plays a vital role in a country's balance of trade.

104. (A) The quaternary sector focuses on knowledge-based activities like R&D, while the tertiary sector provides more conventional services.
While both the tertiary and quaternary sectors provide services, they are distinguished by the nature of the activities involved. The tertiary sector encompasses conventional services like retail, transportation, and personal services. In contrast, the quaternary sector is specifically focused on knowledge-based activities, including information technology, advanced research, and development. This distinction reflects the increasing complexity of modern economies, where intellectual capital and innovation are recognized as a separate and critical driver of economic growth and societal progress.

105. (C) Social equity, environmental protection, and economic viability.
Sustainable natural resource management is built upon three fundamental pillars: environmental protection, economic viability, and social equity. This approach seeks to ensure that resources are used efficiently to support current economic needs while protecting the environment for future generations. Additionally, it emphasizes the fair distribution of resources and opportunities among different social groups. By balancing these three objectives, societies can achieve long-term prosperity without depleting their natural capital or creating significant social inequalities, ensuring a stable and resilient future.

106. (B) 1, 2, and 3 only
Von Thunen's model of agricultural land use is based on several simplifying assumptions, including an isotropic plain with a single central market and uniform transportation costs. The model introduces the concept of locational rent, which decreases as distance from the market increases. It predicts that perishable goods and those with high transport costs will be produced closest to the market. While the model provides a foundation for spatial analysis, it incorrectly assumes that all products can be grown anywhere on the plain without considering environmental variations.

107. (D) The weight of localized raw materials divided by the weight of the final product.
In Alfred Weber's theory of industrial location, the Material Index is a key metric used to determine whether an industry should be located near the source of raw materials or near the market. It is calculated by dividing the total weight of localized raw materials by the weight of the final finished product. This index helps entrepreneurs understand the impact of transportation costs on their overall profitability, providing a mathematical basis for choosing the most efficient and cost-effective site for manufacturing.

108. (B) near the source of raw material.
An industry with a Material Index greater than one is considered weight-losing, meaning the localized raw materials are heavier than the final product. In such cases, it is more economical to locate the factory near the source of the raw materials to avoid the high costs of transporting heavy, unprocessed inputs over long distances. By processing the materials at the source, the company reduces the total weight that must be shipped to the market, thereby minimizing transportation expenses and increasing profitability.

109. (C) Weaver uses standard deviation, while Doi uses the sum of squared differences, which is simpler to calculate.
Both J.C. Weaver and K. Doi developed statistical methods for delineating crop combination regions, but they differ in their mathematical approach. Weaver's method involves the complex calculation of standard deviation to find the combination that best matches a theoretical curve. K. Doi modified this by using the sum of squared differences, which is much simpler and faster to calculate while still providing an accurate reflection of crop diversity. This simplification made the technique more accessible for researchers analyzing agricultural patterns across various regions.

110. (D) A steel mill that supplies sheet metal to the car plant.

NODIA

costs and foster innovation through collaboration and the rapid exchange of information within the industrial cluster.

124. (B) M. E. Hurst
M.E. Hurst was a prominent geographer who introduced a behavioral dimension to the study of spatial interaction. He criticized earlier models, such as those proposed by Ullman, for relying too heavily on the assumption of perfect economic rationality. Hurst argued that human movement and trade decisions are shaped by individual perceptions, knowledge, and psychological factors. This behavioral approach provides a more realistic understanding of why people make certain spatial choices, acknowledging the complexity and subjectivity of human interaction with the environment.

125. (A) P-3, Q-4, R-1, S-2
Regional trade blocs are groups of nations that coordinate their economic policies and reduce trade barriers among themselves. Prominent examples include NAFTA, which links the USA, Canada, and Mexico; ASEAN, representing several Southeast Asian nations; MERCOSUR, which includes major South American economies like Brazil and Argentina; and the European Union, which has created a highly integrated market among many European countries. These blocs aim to promote regional stability, increase collective economic power, and facilitate smoother trade between member states.

126. (D) largest possible market area and maximum profit.
The primary focus of August Losch's industrial location theory is to find the site that allows a producer to maximize their total profit. Unlike earlier models that focused on cost minimization, Losch emphasized the importance of the market area. He used demand cones to illustrate how sales volume decreases with distance from the producer. By controlling the largest possible market area, a firm can increase its total revenue and achieve the highest level of profitability in a competitive spatial economy.

127. (A) produce similar primary commodities, making them competitors rather than partners.
A significant problem for intra-regional cooperation among many developing nations is the competitive nature of their economies. Many of these countries are specialized in the production of similar primary products, such as agricultural goods or minerals, for export to global markets. This similarity limits the potential for mutual exchange within the region, as they do not have complementary needs. Overcoming this challenge requires diversifying their economies and identifying unique areas of specialization where they can cooperate and trade more effectively with one another.

128. (A) Both A and R are true and R is the correct explanation of A.
The globalization of manufacturing has created a new international division of labor, characterized by the global fragmentation of production processes. Companies often locate their research, development, and high-level management in developed nations where there is a skilled workforce and advanced technology. In contrast, labor-intensive assembly and manufacturing tasks are frequently moved to developing countries where costs are lower. This spatial reorganization allows firms to maximize efficiency by taking advantage of the unique economic strengths of different regions across the world.

129. (A) John Friedman
The concept of development from below is a key theme in the later work of John Friedman. This approach emphasizes the importance of local participation, empowerment, and the use of indigenous resources in the development process. It stands in contrast to top-down strategies that are often imposed by central governments or international agencies. By focusing on the needs and capabilities of local communities, development from below aims to promote more equitable and sustainable growth that is better suited to the specific geographic context.

130. (A) Varying soil fertility and climate.
Von Thunen's basic model of agricultural land use is built upon several simplifying assumptions to isolate the impact of transportation costs. These include the existence of an isolated state with a single central market and farmers who act as rational profit-maximizers. Most importantly, the model assumes an isotropic plain with uniform soil fertility and climate in all directions. By

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understanding of viable industrial sites across geographic space.

117. (C) A formal region is characterized by uniformity, while a functional region is characterized by interaction.
Geography distinguishes between different types of regions based on their defining characteristics. A formal region is defined by homogeneity, meaning that it is uniform throughout based on a specific physical or cultural trait. In contrast, a functional region is defined by a system of interactions and movements organized around a central node. While a formal region exists because of shared characteristics, a functional region exists because of the connections and flows that link different places to a central hub within that area.

118. (B) Structuralism and Marxism
Dependency theory is a prominent school of thought within structuralist and Marxist traditions that seeks to explain the persistent underdevelopment of certain nations. It argues that the global economic system is inherently exploitative, with wealth being transferred from the periphery to the core through unequal trade and historical colonial relationships. This perspective focuses on the external structural barriers that prevent developing countries from achieving true economic independence. It highlights the power imbalances that shape the global capitalist system and perpetuate regional disparities.

119. (D) an oil embargo by major producing countries (OPEC).
The world energy crisis of the nineteen-seventies was primarily triggered by an oil embargo imposed by the members of OPEC. This political move led to a sudden and massive increase in global oil prices and created widespread fuel shortages in many developed nations. The crisis highlighted the extreme vulnerability of the global economy to disruptions in energy supply and its heavy reliance on fossil fuels from a few specific regions. It prompted significant changes in energy policy, including increased investment in alternative energy and conservation efforts.

120. (A) Manganese nodules
Natural resources are categorized as biotic or abiotic based on their origin. Biotic resources come from living or organic matter, such as forests, fish, and fossil fuels like coal. Abiotic resources are derived from non-living matter, including minerals, metals, and water. Manganese nodules, which are found on the ocean floor, are a classic example of an abiotic resource. Identifying these resources is important for understanding their extraction methods and their role in industrial production and global resource management strategies.

121. (C) offer a legal framework for resolving trade disputes between member countries.
One of the most critical functions of the World Trade Organisation is its dispute settlement mechanism. This system provides a formal, legal framework for resolving trade conflicts between member countries. When a nation believes that another member is violating WTO rules, it can bring the case to the organization for adjudication. This process ensures that trade rules are enforced fairly and predictably, preventing unilateral trade wars and promoting stability in the global marketplace. It is a vital tool for maintaining international trade cooperation.

NODIA

122. (A) intensive subsistence agriculture.
Paddy cultivation, common in many parts of Asia, is a prime example of intensive subsistence agriculture. This system is characterized by the use of small landholdings and a high amount of labor input per unit of area to maximize output for local consumption. Farmers often use traditional methods and focus on high-yield food crops like rice to support dense local populations. This type of farming is deeply integrated into the socio-economic and cultural fabric of the regions where it is practiced.

123. (D) clustering with other firms, sharing infrastructure and services.
Agglomeration is a key factor in Alfred Weber's theory, referring to the economic benefits that a firm gains by locating in a cluster with other related industries. By being part of an industrial hub, businesses can share costs for essential infrastructure, such as transportation and utilities, and have access to a specialized labor pool and common services. These external economies of scale reduce individual production

is essential for a proper understanding of the diverse approaches to regional development.

97. (B) raw-material-oriented.
According to Alfred Weber's industrial location theory, an industry that processes perishable or weight-losing raw materials is likely to be raw-material-oriented. In the case of fruit canning, the raw materials are highly perishable and lose quality quickly if transported over long distances before processing. By locating the factory close to the source of the fruit, the company can minimize spoilage and reduce the costs associated with transporting bulky, fresh products. This orientation ensures greater efficiency and preserves the quality of the final product.

98. (A) access to a highly educated workforce and robust communication networks.
The growth of information and communication technology and knowledge production industries is primarily driven by the availability of intellectual capital. These sectors require a highly educated and skilled workforce capable of innovation and complex problem-solving. Additionally, a robust and modern communication infrastructure is essential for the global flow of digital information and collaborative research. Unlike traditional heavy industries, these knowledge-based sectors are less dependent on physical raw materials and more focused on human talent and digital connectivity.

99. (C) More severe limitations and narrower choices for agricultural use.
In the Land Capability Classification system, a higher class number indicates that the land has more significant physical limitations for agricultural production. While Class I land has few restrictions and is suitable for a wide range of crops, higher classes like Class VII or VIII have severe limitations, such as steep slopes, poor soil quality, or extreme climate. These restrictions narrow the choices for sustainable farming and may make the land unsuitable for traditional cultivation, requiring it to be used for grazing or wildlife.

100. (B) P-4, Q-2, R-1, S-3
Transport geography involves several fundamental concepts that describe the movement and relationship between locations. Spatial interaction is the general concept of movement and interaction across space. Spatial flow specifically refers to the actual movement of people, goods, or information. Connectivity measures the directness and number of links between places in a network. Accessibility describes the ease with which a specific location can be reached from other points. Together, these terms provide a comprehensive framework for analyzing transportation systems and regional linkages.

101. (C) a high-level government official or a top corporate CEO.
Quinary activities represent a specialized subdivision of the quaternary sector, focusing on high-level decision making and policy formulation. This sector includes individuals like top corporate executives, government officials, and research scientists who make critical decisions that affect the broader economy and society. These roles involve complex analysis and strategic planning, distinguishing them from more conventional service or information-processing jobs. The quinary sector represents the pinnacle of intellectual leadership and management in modern, highly developed societies.

102. (B) All natural resources are equally easy to access and exploit.
Natural resources present several management challenges, as they are often non-renewable, finite, and unevenly distributed across the globe. Exploiting these resources can lead to significant environmental degradation if not managed sustainably. Furthermore, it is incorrect to suggest that all resources are equally easy to access; many are located in remote areas or require advanced technology for extraction. These variations in accessibility and environmental impact are central problems that must be addressed in resource management and international economic policy.

103. (A) Both A and R are true and R is the correct explanation of A.
The tourism industry is frequently described as an invisible export because it generates foreign exchange without the physical shipment of goods across borders. When international tourists visit a country, they spend money on services

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removing environmental variables, Von Thunen was able to demonstrate how distance from the market alone can determine patterns of land use and intensity.

131. (A) 1 and 2
In Gunnar Myrdal's theory of cumulative causation, backwash effects are the negative processes that increase regional inequality. They include the migration of young, skilled labor from the periphery to the core in search of better opportunities, and the flow of capital and savings from poorer regions to be invested in the more profitable core. These processes further weaken the periphery while strengthening the core, leading to a self-reinforcing cycle of regional divergence that is difficult to reverse without significant policy intervention.

132. (D) mitigate risks from price fluctuations and climate change, and improve nutrition.
Governments often encourage crop diversification to enhance the resilience and sustainability of the agricultural sector. By growing a variety of crops, farmers can protect themselves against total loss from pests, diseases, or extreme weather events like droughts. Diversification also helps mitigate the impact of global price fluctuations for specific commodities. Furthermore, cultivating a wider range of crops can improve the nutritional security of the local population and maintain soil health through varied nutrient requirements, leading to long-term agricultural stability.

133. (C) a firm can locate and earn a profit.
D.M. Smith's concept of spatial margins to profitability identifies a geographic area within which a business can operate successfully. Within these margins, the total revenue generated by a firm exceeds its total production and transportation costs, allowing for a profit to be made. While there may be one optimal point for profit maximization, several other locations within the margins are still economically viable. This model provides a more realistic understanding of industrial location by acknowledging that businesses have some flexibility in their choice of site.

134. (B) a tourist decides to visit a nearby beach instead of a more distant, famous one they had originally planned to see.
Intervening opportunity occurs when a closer alternative satisfies a specific demand, thereby reducing the interaction with a more distant location. A tourist who chooses a nearby beach over a more famous but distant one is a perfect example of this concept. The presence of the closer option acts as an intervention that diverts the flow of people. Understanding intervening opportunities is essential for analyzing travel patterns, retail location decisions, and the spatial behavior of consumers who often seek to minimize travel time and costs.

135. (D) the socio-economic and political division between wealthy, developed countries (the 'North') and poorer, developing countries (the 'South').
The North-South divide is a term used to describe the persistent socio-economic and political gap between the wealthy, industrialized nations of the Global North and the poorer, developing nations of the Global South. This divide highlights significant inequalities in income, technology, health, and education across the world. It is a major focus of international development studies, reflecting the long-term impact of historical processes such as colonialism and the structural inequalities within the global capitalist system that continue to shape regional development today.

136. (A) 1 and 2
Backwash effects, as defined by Gunnar Myrdal, represent the mechanisms through which regional inequalities are reinforced. The primary examples are the brain drain, where skilled and educated labor leaves the periphery for the core, and the transfer of capital from poorer areas to be invested in the more developed core. These processes create a self-perpetuating cycle where the periphery loses its most vital resources, hindering its development while further accelerating the growth and dominance of the core region within a country.

NODIA

137. (C) The demand for the creation of the state of Jharkhand
The demand for the creation of Jharkhand from Bihar is a prominent example of a social movement in India directly related to regional development aspirations. This movement was driven by the perception that the resource-rich

tribal region was being neglected and exploited by the central administration. Proponents argued that a separate state would allow for better local governance, control over resources, and a development path that reflected the unique needs and culture of the local population. It highlights the link between geography and development.

138. (A) increased competition for domestic industries in many countries.
The liberalisation of world trade under the World Trade Organisation has led to a significant increase in international competition. By reducing tariffs and other trade barriers, the WTO has made it easier for foreign goods to enter domestic markets. While this provides consumers with more choices and lower prices, it can also pose significant challenges for less efficient local industries that may struggle to compete with cheaper imports. This process has forced many countries to restructure their economies and focus on areas where they have a comparative advantage.

139. (C) Statement I is true, but Statement II is false.
Allan Pred's behavioral matrix focuses on the role of information and decision-making in industrial location. He argued that the choices made by entrepreneurs are shaped by the quantity and quality of information they possess. However, Pred did not believe that these decisions are always perfectly rational or optimal. Instead, he recognized that individual abilities to process and act upon information vary, leading to a wide range of location choices that may not always be the most economically efficient, but reflect the decision-maker's unique perceptions and capabilities.

140. (B) resolve conflicts between competing land uses and promote sustainable development.
Regional land use planning is a strategic process aimed at organizing the physical environment to achieve social, economic, and environmental goals. Its primary objective is to resolve conflicts between competing land uses, such as agriculture, industry, and housing, while ensuring that development is sustainable. By implementing a rational and systematic plan, geographers and planners can protect natural resources, improve infrastructure, and enhance the quality of life for the local population. This practice is essential for preventing haphazard growth and promoting the orderly development of regions.

141. (C) a functionally integrated and interdependent national space-economy.
The final stage of John Friedman's four-stage core-periphery model represents the highest level of regional development and integration. In this stage, the national territory is no longer dominated by a single, overwhelming core. Instead, it has evolved into a functionally integrated system of cities and regions that are mutually interdependent. Wealth, infrastructure, and economic opportunities are more evenly distributed, and the extreme spatial inequalities of earlier stages are significantly reduced. This mature stage supports a stable and balanced national economy with strong internal linkages and cooperation.

142. (D) its large-scale, monocultural production of cash crops for export.
Plantation agriculture is a specialized agricultural system characterized by the large-scale, monocultural production of cash crops, such as tea, coffee, rubber, or sugarcane. These plantations are typically owned by large corporations or states and use significant amounts of labor and capital. The primary goal is to produce goods for international export rather than local subsistence. This system often has deep historical roots in colonialism and continues to be a major part of the economies of many tropical developing countries, creating strong linkages with global markets.

143. (A) Availability of a highly skilled and educated workforce
In the modern knowledge economy, the factors of industrial location have shifted toward human capital and intellectual resources. Industries such as information technology, biotechnology, and advanced research require a highly skilled and educated workforce to drive innovation and maintain competitiveness. Consequently, these industries tend to cluster near major universities and research institutions where there is a large pool of talent. Access to physical raw materials has become less important than access to the brainpower and digital infrastructure necessary for high-level information processing and knowledge production.

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144. (B) Transferability.
In Edward Ullman's framework of spatial interaction, transferability refers to the feasibility of moving a good considering the costs and physical barriers of distance. If a product is extremely fragile, perishable, or very expensive to ship relative to its value, it has low transferability. This means that it is not economically viable to transport it over long distances, and interaction between distant supply and demand points for such goods will be limited. Advances in packaging and transportation technology generally work to increase transferability by reducing these physical and financial risks.

145. (A) Andre Gunder Frank
The concept of the development of underdevelopment is a central tenet of Andre Gunder Frank's dependency theory. He argued that the poverty of the Global South is not a result of a lack of progress but is a condition actively created by the historical and economic integration of these regions into the global capitalist system. This process allows the core nations to accumulate wealth by exploiting the resources and labor of the periphery. Therefore, underdevelopment is seen as a structural problem that is inherently linked to the development of wealthier nations.

146. (A) The Maximum Positive Deviation Method
S.M. Rafiullah proposed the maximum positive deviation method as a significant modification to Weaver's statistical technique for delineating crop combination regions. He aimed to create a more accurate and simpler approach that could better reflect the complexities of varied agricultural landscapes. By focusing on the maximum positive deviation from a theoretical curve, Rafiullah's method allowed researchers to identify dominant crop patterns more effectively. This technique provided a valuable tool for geographers analyzing agricultural diversity and specialization, particularly in the context of developing regions like India.

147. (C) To create a system for understanding, comparing, and analyzing spatial patterns and processes.
The fundamental purpose of creating a typology of regions is to provide a systematic framework for geographical analysis. By classifying different types of regions, such as formal, functional, and perceptual, geographers can organize complex spatial information into meaningful units. This allows for more effective comparison between different areas and helps in identifying the underlying processes that shape spatial patterns. Typologies provide a common language for researchers and planners to understand the diverse ways in which the earth's surface is organized and utilized by human societies.

148. (D) the impact of globalization on the manufacturing sector.
A clothing company that separates its design and marketing functions from its manufacturing operations is a prime example of the impact of globalization on the manufacturing sector. This fragmentation of production allows firms to maximize efficiency by locating different activities where costs are lowest and specific skills are available. By outsourcing assembly to a country with cheap labor like Bangladesh, while keeping high-level management in Italy, the company takes advantage of the global international division of labor. This process has fundamentally reshaped industrial patterns and international trade across the world.

149. (C) land productivity.
Agricultural productivity can be measured in several ways to reflect the efficiency of different factors of production. When productivity is expressed as yield per hectare, it is a direct measure of land productivity. This metric evaluates how much output is being produced from a specific unit of land. It is a critical indicator for understanding the efficiency of farming practices, the impact of technological inputs like fertilizers and irrigation, and the overall capacity of a region's soil and climate to support agricultural production for its population.

150. (B) P-2, Q-4, R-1, S-3
Spatial interaction is shaped by several key concepts that describe the movement between locations. Complementarity exists when there is a supply-demand relationship between regions, such as Florida's surplus of oranges and New England's demand. Transferability deals with the cost of overcoming distance, particularly for low-value, bulky goods. Intervening opportunity occurs when a closer alternative diverts a flow.

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such as research and development, information technology, and high-level intellectual services. As societies become more advanced, the production and strategic use of knowledge become critical drivers of economic growth and social progress. This sector is distinct from basic services because it relies heavily on innovation and intellectual capital, reflecting the transition toward a post-industrial and information-driven global economy.

191. (A) the increasing share of services and high-tech products in global trade.
A significant shift in world trade patterns since the mid-twentieth century has been the growing importance of services and high-technology products. While trade in primary commodities was once dominant, it now accounts for a smaller share of the global total. This change reflects the increasing complexity of the global economy and the rise of knowledge-based industries. Modern trade is characterized by the global flow of information, finance, and specialized technology, highlighting the shift toward a more integrated and service-oriented international economic system that drives worldwide growth.

192. (B) Material Index
Various indices are used in transport geography to measure network connectivity and accessibility, such as the Beta Index, Gamma Index, and Shimbel Index. These metrics help in quantifying the structure and efficiency of transportation systems. However, the Material Index is not related to transport networks; instead, it is a concept from industrial location theory that relates the weight of raw materials to the weight of the final product. Understanding the correct application of these indices is essential for systematic geographic analysis across different sub-disciplines, from transport to industrial location.

193. (B) the development and spread of high-yield variety (HYV) seeds, fertilizers, and irrigation.
The Green Revolution was a pivotal event in agricultural geography that significantly increased food production through the adoption of modern technological inputs. It involved the development and widespread use of high-yield variety seeds, particularly for wheat and rice, alongside chemical fertilizers and improved irrigation systems. While it led to massive increases in yields and helped reduce global hunger, it also raised concerns regarding environmental sustainability and social equity. This revolution transformed farming practices and has had a lasting impact on the global agricultural landscape and food security.

194. (A) intra-regional cooperation.
The European Union serves as a prominent example of intra-regional cooperation, promoting economic integration among its member states. It fosters free trade within the bloc by removing internal barriers and creates a common trade policy toward the rest of the world. This cooperation allows member nations to achieve economies of scale and increase their collective economic power. By coordinating their policies, they can address shared challenges more effectively and promote regional stability and prosperity in the increasingly competitive and complex global marketplace.

195. (C) simplify the calculations for manual use.
S.M. Rafiullah modified Weaver's statistical method for delineating crop combination regions with the primary goal of simplifying the complex calculations required. His approach aimed to make the technique more accessible and practical for researchers who did not have access to advanced computing tools at the time. By creating a more straightforward mathematical model, Rafiullah allowed for more efficient analysis of agricultural patterns and land use diversity. This modification made the study of crop combinations more widely applicable, particularly in the geographic context of diverse agricultural regions.

196. (D) Formal Region.
A formal region is a geographic area defined by homogeneity in one or more specific criteria, such as a common climate, language, or level of economic activity. Within a formal region, the defining characteristic is uniform throughout the entire territory. This concept allows geographers to divide the world into distinct units for systematic spatial analysis and to identify patterns of variation across different geographic landscapes. Understanding formal regions is fundamental for studying the spatial organization

NODIA

as being structured to benefit wealthy nations at the expense of developing ones. This is achieved through unequal trade patterns, where the periphery provides cheap raw materials and labor to the core. This structural relationship creates a cycle of dependence and prevents peripheral regions from achieving independent development, perpetuating a system where wealth and power remain concentrated in a few developed nations.

158. (D) Implementing policies for conservation and sustainable utilization.
A key component of natural resource management is the implementation of policies that promote conservation and sustainable utilization. This approach seeks to ensure that resources are used efficiently to meet current needs without compromising the ability of future generations to meet their own. By managing resources in a way that protects ecosystems and maintains their long-term viability, societies can achieve a balance between economic growth and environmental preservation. This is essential for preventing resource depletion and ensuring that the natural capital on which we depend remains available.

159. (A) the nature of the economic activity.
The classification of economic activities into primary, secondary, tertiary, and quaternary sectors is based on the nature of the tasks performed. Primary activities involve the extraction of raw materials, secondary activities focus on manufacturing and processing, and tertiary activities provide services. The quaternary sector is centered on knowledge and information. This system allows geographers to analyze the economic structure of a region and how it changes over time as societies develop and move through different stages of industrialization and technological advancement.

160. (B) Addressing issues like environmental protection and labor standards within its trade framework.
A major challenge for the World Trade Organisation in the twenty-first century is to address complex social and environmental issues within its international trade framework. There is growing pressure to incorporate standards for environmental protection and labor rights into trade agreements. Reconciling these objectives with the goal of trade liberalisation is difficult and often leads to disputes between member nations. Finding a way to promote fair and sustainable trade while addressing the diverse concerns of its members is essential for the future effectiveness and legitimacy of the WTO.

161. (A) 1, 2, 3, and 4
Theories of industrial location have evolved significantly, with several scholars introducing unique perspectives. Alfred Weber focused on least-cost analysis, while August Losch emphasized profit maximization through market area analysis. E.M. Hoover integrated both transport and production costs into his model. Allan Pred introduced behavioral elements, acknowledging the role of information and individual decision-making in location choices. Together, these theories provide a comprehensive framework for understanding the complex spatial organization of industrial activities and why firms choose to locate in specific geographic areas over others.

162. (A) why regional economic inequalities persist and often intensify.
Gunnar Myrdal propounded the theory of cumulative causation to explain the persistence and intensification of regional economic inequalities. He argued that once a region begins to grow, it attracts more capital and labor from other areas, creating a self-reinforcing cycle of development. Meanwhile, peripheral regions experience backwash effects that further weaken them. While some spread effects may occur, they are often insufficient to overcome the initial disparities. This theory challenges the idea that market forces naturally lead to regional convergence, highlighting the need for active policy intervention.

163. (C) Albert O. Hirschman
The concept of forward and backward linkages is central to the regional development theory of Albert O. Hirschman. Backward linkages occur when an industry creates demand for inputs from earlier stages of production, while forward linkages exist when its output becomes an input for a subsequent industry. Hirschman argued that by investing in leading sectors with strong linkages, countries can trigger a chain reaction

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Distance decay explains how interaction volume decreases as distance increases. Together, these factors provide a comprehensive framework for analyzing the spatial flow of goods, people, and information across different geographic landscapes.

151. (D) The national anthem of the country.
Agricultural productivity is determined by a wide range of factors, including environmental conditions like climate and soil, institutional factors like land tenure, and technological inputs such as irrigation and machinery. These elements directly impact the efficiency and output of the farming process. In contrast, cultural symbols like a national anthem have no direct influence on the technical or economic performance of the agricultural sector. Understanding the real determinants of productivity is essential for developing effective policies to improve food security and rural livelihoods.

152. (A) ownership.
Industries are classified into various categories based on their ownership and control. The public sector includes industries owned and operated by the government, while the private sector comprises businesses owned by individuals or corporations. The joint sector involves a partnership between the government and private entities. This classification is important for understanding the economic structure of a country and the role of the state in industrial development. Ownership often influences the goals of the industry, such as prioritizing profit or providing essential public services to the citizens.

153. (A) Both A and R are true and R is the correct explanation of A.
A footloose industry is not tied to any specific location because it is not significantly affected by transport costs or proximity to raw materials. These industries typically produce high-value, lightweight goods where transportation expenses are a very small part of total costs. This independence allows them to locate anywhere that offers other advantages, such as a skilled labor force or good digital infrastructure. The ability to relocate easily based on these non-resource-based factors is the defining characteristic of footloose manufacturing in the modern global economy.

154. (A) historical processes like colonialism and uneven economic development.
The existence of significant disparities between different world regions is primarily rooted in deep-seated historical processes. Colonialism, for example, often established exploitative relationships that extracted wealth from the periphery to the core, creating structural inequalities that persist today. This history has led to a pattern of uneven economic development where certain regions accumulated capital and technology while others remained marginalized. These long-term spatial imbalances continue to shape global patterns of wealth, power, and development, contributing to the persistent North-South divide in the contemporary world.

NODIA

155. (D) Functional (Nodal) Region
A newspaper's delivery area is a classic example of a functional or nodal region. This type of region is defined by a set of interactions and flows that are organized around a central focal point, which in this case is the newspaper's publishing or distribution center. The boundaries of the region are determined by the reach of the interaction, which may be fluid and non-uniform. Analyzing such regions helps in understanding how central nodes serve and influence their surrounding territory through the provision of goods, services, and information.

156. (D) 1, 2, 3, and 4
Globalization can have several significant negative impacts on the manufacturing sectors of less developed countries. Increased competition from foreign firms may harm local industries that are unable to compete with cheaper imports. Additionally, the pursuit of lower production costs often leads to the exploitation of labor and environmental degradation due to lenient regulations. Over-dependence on foreign markets and capital also makes these economies vulnerable to global shocks. Addressing these challenges is essential for promoting more equitable and sustainable industrial growth in the developing world.

157. (C) exploitation and structural inequality.
According to dependency theory, the relationship between core and periphery nations is fundamentally one of exploitation and structural inequality. The global economic system is viewed

no overarching sovereign authority to enforce rules. This often leads to the overexploitation of resources and environmental degradation as individual nations and corporations pursue their own short-term interests. International treaties and cooperation are essential for the sustainable management of these shared spaces. However, reaching consensus and ensuring compliance among diverse nations remains a significant challenge for international environmental policy and resource management efforts globally.

171. (D) ICT and Knowledge Production
Silicon Valley in California is a world-renowned example of a region dominated by information technology and knowledge production industries. It became a global center for innovation due to its close proximity to major research universities and a highly skilled workforce. The region is home to a dense concentration of companies specializing in software development, electronics, and digital services. This cluster of knowledge-based industries exemplifies how intellectual capital and technological advancement have become the primary drivers of economic growth and regional development in the modern, globalized post-industrial economy.

172. (B) market area and profit maximization analysis.
August Losch made a major contribution to industrial location theory by shifting the focus from cost minimization to market area and profit maximization. He argued that the most important factor in a firm's location decision is its ability to control the largest possible market to increase total revenue. By using demand cones to illustrate how sales volume decreases with distance, Losch provided a more comprehensive understanding of spatial competition. This approach emphasizes the role of the consumer and the spatial structure of demand in shaping industrial patterns.

173. (C) development studies and regional geography.
The dependency ratio is a concept widely used in development studies and regional geography to analyze the demographic structure of a population. It relates the number of dependents, such as children and the elderly, to the size of the working-age population. A high dependency ratio can place a significant burden on the economy, as the workforce must support a larger number of non-productive individuals. Understanding this ratio is essential for planning for future social services, healthcare, and economic growth in different regions and nations across the world.

174. (D) Call center operation
The secondary sector of the economy focuses on the processing of raw materials into finished or semi-finished goods through manufacturing and construction. Iron smelting, car assembly, and construction are all classic examples of secondary activities that involve significant physical transformation of materials. In contrast, a call center operation provides services and information processing, which places it in the tertiary or quaternary sector rather than the secondary. Distinguishing between these sectors is essential for analyzing the economic structure and developmental stage of a country or region.

175. (B) P-3, Q-4, R-1, S-2
Land Capability Classification is a system for grouping soils based on their agricultural potential and physical limitations. Class I land has few restrictions and is suitable for most crops. Class IV land has very severe limitations that restrict the choice of plants and require careful management. Class VI land is generally unsuitable for cultivation but can be used for grazing or forestry. Class VIII land is restricted to non-commercial uses like recreation and wildlife. This classification helps in planning sustainable land use while preventing long-term environmental degradation and soil erosion.

176. (B) A factory in a core region creating demand for raw materials from a peripheral region.
Spread effects, as described by Gunnar Myrdal, are the positive impacts that the growth of a core region can have on the surrounding periphery. A classic example is a factory in the core creating a new market and demand for raw materials produced in the peripheral region. This process can stimulate economic activity and potentially lead to growth in poorer areas. While backwash effects tend to increase inequality, spread effects represent the diffusion of development and innovation from the core to the periphery, promoting more balanced regional growth within a country.

177. (B) price volatility in the global market.

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of development throughout their economies. This strategy of unbalanced growth focuses on maximizing the stimulus for further investment and industrial expansion across different sectors.

164. (C) Statement I is true, but Statement II is false.
Mediterranean agriculture is a specialized system characterized by viticulture and the production of citrus fruits, olives, and grapes. While this system is common in the countries bordering the Mediterranean Sea, it is not found exclusively there. Similar climatic conditions exist in parts of California, South Africa, Chile, and Australia, where this type of agriculture is also practiced. Identifying these global patterns of Mediterranean-style farming is important for understanding how agricultural systems are adapted to specific environmental conditions, particularly mild, wet winters and hot, dry summers.

165. (C) 1.3
The Beta Index is a measure used in transport geography to quantify the connectivity of a network. It is calculated by dividing the number of edges by the number of vertices. For a network with ten nodes and thirteen links, the Beta Index is one-point-three. A higher index value indicates a more complex and well-connected network, which is generally more efficient for the movement of goods and people. This simple metric allows researchers to compare the development of transportation infrastructure across different regions and analyze their spatial integration.

166. (B) 2, 4, 3, 1
Nations typically follow a specific sequence of economic development characterized by the dominance of different sectors. The process begins with a focus on primary activities like agriculture and raw material extraction. As the economy develops, it transitions into a phase where manufacturing and secondary processing industries dominate. Later, the tertiary sector, involving services like retail and finance, becomes the primary employer. Finally, in a post-industrial stage, knowledge production and information technology industries within the quaternary sector become the most important drivers of national economic growth and innovation.

167. (D) Perceptual (or Vernacular) Region
A perceptual or vernacular region is a geographic area that exists based on the collective attitudes and feelings of its inhabitants rather than precise, official boundaries. The Midwest in the United States is a classic example of this regional type. People have a shared sense of identity and common understanding of the area's characteristics, even though its exact borders are not defined by a single administrative or physical criterion. These regions are important because they reflect how people perceive and connect with the geographic space they live in.

168. (A) Economic Globalization
Economic globalization refers to the increasing integration and interdependence of local, regional, and national economies through the movement of goods, capital, technology, and information across international borders. This process has been facilitated by liberalisation and improvements in transportation and communication. It has led to the creation of a more integrated global market where the economic fortunes of different regions are closely linked. While it has promoted global growth, it has also raised significant challenges regarding regional disparities, labor rights, and the stability of the global financial system.

169. (C) Renewable resources can be replenished within a human lifespan, while non-renewable resources cannot.
The primary difference between renewable and non-renewable resources is their rate of replenishment relative to human consumption. Renewable resources, such as solar energy and timber, can be naturally replaced or replenished within a reasonable timeframe. In contrast, non-renewable resources, such as petroleum and minerals, take millions of years to form and are available in a finite supply. Managing these resources sustainably is crucial for ensuring that the global economy can continue to function without depleting the natural capital on which all human societies depend.

NODIA

170. (A) the absence of a single sovereign authority to enforce rules.
Managing global commons, such as the high seas or Antarctica, is difficult because they do not belong to any single nation and there is

regional development, international trade, and the complex organization of the modern global economy.

184. (C) Statement I is true, but Statement II is false.
The WTO principle of national treatment is designed to prevent discrimination against imported goods within a domestic market. It requires that foreign products be treated the same as locally produced goods once they have passed through customs and entered the country. This means that a country cannot apply higher internal taxes or more restrictive regulations on imported goods than on its own domestic products. This principle ensures a fair and competitive market environment and is a cornerstone of the WTO's goal of promoting free and equitable international trade between member nations.

185. (C) a series of independent local centers with minimal interaction.
In the initial stage of John Friedman's core-periphery model, the geographic space is characterized by a series of independent local centers with very little interaction between them. This stage reflects a pre-industrial society where economic activities are fragmented and mostly self-sufficient. There is no single dominant core, and the national economy is not yet integrated into a larger functional system. Understanding this starting point is essential for analyzing the subsequent stages of industrialization and the emergence of a more centralized and eventually integrated spatial structure within a country.

186. (A) 1, 2, 3 and 4
Inter- and intra-regional cooperation and trade can face several significant problems, including the potential loss of national sovereignty to a larger regional body. Increased competition can also harm less efficient domestic industries that were previously protected by trade barriers. Furthermore, disagreements over regulations and the unequal distribution of benefits among member states can lead to internal tensions and trade disputes. Addressing these challenges is essential for ensuring that regional integration is successful and provides long-term economic gains for all participating nations in the competitive global marketplace.

187. (D) Albert O. Hirschman
Albert O. Hirschman was a forceful advocate for the strategy of unbalanced growth as a more realistic path for development in poorer countries. He argued that since resources are limited, they should be concentrated in leading sectors with strong linkages to stimulate overall growth. This approach challenges the idea that investment must be spread equally across all sectors. By creating strategic imbalances, the theory aims to trigger a chain reaction of further investment and innovation, eventually pulling the entire economy forward through a series of dynamic spatial and economic processes.

188. (B) a fictional region has no basis in reality, while a formal region is defined by measurable data.
A key difference between a fictional region and a formal region lies in their basis in reality. A formal region is defined by homogeneity in one or more observable and measurable characteristics, such as climate, soil, or language. In contrast, a fictional region exists only in the human imagination, literature, or film and has no corresponding physical space in the real world. While fictional regions can be studied to understand spatial perceptions, formal regions are essential for analyzing the actual patterns of geographic variation and the organization of the earth's surface.

189. (C) fossil fuels.
A primary driver of the world energy crisis is the global economy's heavy and persistent reliance on fossil fuels, such as petroleum, natural gas, and coal. These resources are finite and non-renewable, making the global energy supply vulnerable to depletion and price volatility. Additionally, the concentration of these reserves in a few specific regions creates significant geopolitical tensions and risks of supply disruption. Addressing the energy crisis requires a long-term transition toward more sustainable and renewable energy sources, as well as significant improvements in energy efficiency across all sectors of society.

190. (D) The economic sector dealing with information and knowledge.
The quaternary sector represents the knowledge-based part of the economy, focusing on the creation, processing, and management of information. This sector includes activities

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Countries that rely heavily on the export of a single primary commodity face significant economic risks due to the volatility of global market prices. These commodities are often subject to sudden and massive price fluctuations driven by changes in international demand, political events, or climate conditions. This instability can lead to unpredictable national income, making long-term economic planning difficult and hindering overall development. Diversifying the economy is a key strategy for reducing this vulnerability and creating more stable and resilient national and regional economic systems.

178. (A) Both A and R are true and R is the correct explanation of A.
The Gravity Model of spatial interaction must be carefully calibrated to reflect different types of human behavior and travel patterns. People are generally more willing to overcome the friction of distance and travel longer distances for high-value or specialized services that are not available locally. In contrast, for daily grocery shopping, the deterrent effect of distance is much stronger. By adjusting the distance exponent in the model, geographers can more accurately predict and analyze the volume of flows for various social and economic activities across a territory.

179. (C) least deviation from a theoretical curve.
J.C. Weaver's method for delineating crop combination regions is based on a statistical approach that seeks to find the combination with the least deviation from a theoretical curve. This method allows researchers to objectively determine which crops are most dominant in a specific area by comparing actual land use percentages with a series of ideal models. By minimizing this variance, Weaver provided a rigorous and scientific way to analyze agricultural diversity and identify spatial patterns of specialization. This technique is a fundamental tool for researchers in the field of agricultural geography.

180. (D) facilitate economic integration and trade among member nations.
The primary purpose of global economic blocs is to facilitate economic integration and trade among their member nations. By reducing or eliminating internal tariffs and coordinating trade policies, these groups aim to create larger, more efficient markets. This cooperation allows member states to achieve economies of scale and increase their collective bargaining power in the global arena. Prominent examples like ASEAN and MERCOSUR demonstrate how regional integration can promote economic stability and growth by fostering stronger links and mutual cooperation between neighboring nations.

NODIA

181. (B) 1, 2 and 3 only
The tourism industry is a major source of foreign exchange and employment for many nations, creating strong economic linkages across several sectors. It is often considered a smokeless industry because it generates income without the heavy environmental pollution of traditional manufacturing, although it can still have negative local impacts if not managed well. However, tourism is not immune to global events; it is highly vulnerable to political instability, economic downturns, and health crises. Understanding these characteristics is essential for planning sustainable tourism development that benefits both visitors and host communities.

182. (B) weight-losing industry.
A weight-losing industry is one where the final product is lighter or less bulky than the raw materials used in its production. For such industries, like steel manufacturing, transportation costs are minimized by locating the factory near the source of the heavy raw materials, such as coal and iron ore. This decision reduces the weight that must be shipped to the market, thereby lowering total transport expenses and increasing overall profitability. This orientation is a fundamental principle in industrial location theory for explaining the spatial distribution of heavy manufacturing activities.

183. (D) Economic Geography.
Economic geography is the branch of geography that focuses on the study of the spatial distribution of economic activities and the factors that influence them. This field examines the processes of production, exchange, and consumption across different scales, from local to global. It analyzes why certain industries locate in specific areas and how economic systems shape and are shaped by the geographic environment. By understanding these spatial patterns and processes, economic geographers provide valuable insights into

of both physical and human phenomena on the earth's surface.

197. (C) market-oriented.
According to Alfred Weber's industrial location theory, an industry where the final product is heavier or more bulky than the localized raw materials is likely to be market-oriented. This is because it is more economical to locate the factory close to the consumers to minimize the costs of transporting the final, heavier product. Examples like bread baking and soft drink bottling fit this description. By locating near the market, these industries can reduce their total transportation expenses and improve their overall efficiency and profitability in a competitive economic environment.

198. (B) developing countries lack the resources for balanced growth, so strategic imbalances can trigger development.
The central argument of Albert O. Hirschman's theory is that developing nations often lack the financial and human capital necessary for balanced growth across all economic sectors. Instead, he advocated for a strategy of unbalanced growth, where investment is concentrated in a few key sectors with strong linkages. These leading industries will then create pressures and incentives for development in other parts of the economy. This approach recognizes that strategic imbalances can act as a catalyst for overall economic progress by triggering a chain reaction of further investment and innovation.

199. (D) It averages wealth and can hide significant income inequality within a region.
A significant limitation of using Gross Domestic Product per capita as the sole measure of regional development is that it represents an average value. This can mask significant income inequalities and disparities in the distribution of wealth within a specific region or country. While a high GDP per capita suggests overall economic prosperity, it does not account for the quality of life or access to services for the broader population. Therefore, more comprehensive indices that include social and environmental factors are necessary for a realistic assessment of regional development and well-being.

200. (B) P-4, Q-2, R-1, S-3
Regional development theories have been shaped by several key scholars with distinct perspectives. Albert O. Hirschman introduced the concept of forward and backward linkages to describe sectoral relationships. Gunnar Myrdal focused on spread and backwash effects within his theory of cumulative causation. John Friedman developed the core-periphery model to explain the stages of spatial integration in a national economy. Andre Gunder Frank's dependency theory focused on how the development of core nations leads to the underdevelopment of the periphery. These theories provide a comprehensive framework for analyzing spatial disparities.

NODIA

201. (C) Tertiary and Quaternary
In a post-industrial society, the majority of employment and economic output is generated in the tertiary and quaternary sectors. As nations develop and become more technologically advanced, the traditional dominance of the primary and secondary sectors declines. Instead, the economy becomes focused on providing services and managing knowledge-based activities, such as information technology, research, and finance. This transition reflects a maturing economy where intellectual capital and service provision are recognized as the primary drivers of growth, innovation, and social development in the modern globalized world.

202. (A) petroleum and natural gas.
The world energy crisis highlights the immense geopolitical importance of regions with large reserves of petroleum and natural gas. Because the global economy is heavily dependent on these finite fossil fuels, the nations that control their supply wield significant influence on international trade and politics. The concentration of these resources in specific, often politically sensitive areas makes energy security a top priority for developed nations. This dependency has led to numerous international conflicts and continues to shape global diplomatic relations and long-term economic strategies for many regions.

203. (A) Both A and R are true and R is the correct explanation of A.
In Von Thunen's model of agricultural land use, land rent is highest closest to the central market and decreases with distance. This happens because transportation costs increase as a farm is

on unbalanced growth and linkages became influential. John Friedman's four-stage core-periphery model was developed in the mid-nineteen-sixties. Finally, Andre Gunder Frank's dependency theory gained widespread attention in the late nineteen-sixties and early seventies, providing a structuralist critique of development that focused on the exploitative relationship between core and periphery nations within the global capitalist economic system.

217. (C) maximize profits by controlling the largest possible market area.
In August Losch's industrial location model, the primary goal of any producer is to maximize their total profit. Losch shifted the focus away from simple cost minimization toward the importance of the market area. He argued that the most profitable location is the one that allows a firm to control the largest possible area and sell to the most consumers. By using demand cones, he demonstrated how spatial competition between firms determines the size and shape of market areas and the optimal spatial organization of industries in a market economy.

218. (A) financial services provided by a London-based bank to a client in New York.
Invisible trade refers to the exchange of services across international borders without the physical movement of tangible goods. Financial services, such as banking or insurance provided by one country to a client in another, are classic examples of this. Other forms of invisible trade include tourism, royalties, and professional consulting. While these transactions do not involve physical products, they earn foreign exchange and contribute significantly to a country's balance of payments. As economies become more service-oriented, invisible trade has become an increasingly important part of global economic integration.

219. (D) the aesthetic design of the country's national flag.
Regional variations in agricultural productivity are driven by several important factors, including environmental conditions like soil and climate, and socio-economic factors like access to technology, infrastructure, and land tenure. These elements directly impact the efficiency and output of the farming process. In contrast, the aesthetic design of a national flag has no relationship with the technical or economic performance of the agricultural sector. Understanding the real drivers of productivity is essential for creating effective regional development policies that aim to improve food security and reduce spatial inequalities within a country.

220. (B) Dependency Theory.
The central tenet of dependency theory is that development in core nations is intrinsically linked to the underdevelopment of peripheral regions. This perspective argues that the global economic system is structured to exploit the resources and labor of poorer countries to fuel the growth of wealthy ones. This process creates a cycle of structural inequality and dependence that prevents peripheral nations from achieving true economic independence. Analyzing these power imbalances is crucial for understanding world regional disparities and the complex historical processes that have shaped the contemporary global capitalist economic system.

221. (C) Primary activities
Primary activities are the most fundamental level of economic production, as they are directly dependent on the exploitation of natural resources from the environment. These activities involve the direct extraction or harvesting of raw materials from the earth's surface or interior, such as in agriculture, mining, forestry, and fishing. Without these basic resources, the subsequent stages of industrial processing in the secondary sector and service provision in the tertiary sector would not be possible. These tasks provide the essential building blocks for all other forms of economic development across different regions.

222. (D) diminishes the complementarity between the original supply and demand points.
An intervening opportunity poses a significant challenge to spatial interaction because it provides an alternative source of supply or a closer destination that satisfies a specific demand. When this happens, the mutual relationship or complementarity between the original origin and the more distant target is diminished or eliminated. People and goods will naturally flow to the closer option to save time and money. Understanding these interventions is essential for analyzing and predicting patterns of movement

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210. (A) regional development and local communities' rights over resources.
The Chipko movement in India is a prominent environmental social movement that also reflects deep-seated concerns about regional development. While its primary focus was on forest conservation, it also represented the struggle of local communities to maintain control over their natural resources and have a say in how their region is developed. The movement challenged top-down industrial policies that favored external commercial interests over the needs and rights of the people who depend on the forest for their livelihoods. It highlight the link between ecological health and local autonomy.

211. (A) 1, 2, 3, and 5
The geography of transport and trade is built upon several fundamental concepts, including Ullman's bases for interaction and the Gravity Model. These frameworks help in explaining the volume and pattern of flows between locations. Additionally, the transition from GATT to the World Trade Organisation represents a significant milestone in global trade regulation. The introduction of behavioral perspectives by geographers like M.E. Hurst has also provided a more nuanced understanding of human movement. Together, these theories and institutions shape our understanding of how transportation and trade drive global economic integration.

212. (D) To classify land based on its suitability for sustained agricultural production without degradation.
The fundamental idea behind Land Capability Classification is to group different types of land based on their potential for sustained agricultural production. This system evaluates several factors, including soil quality, slope, and environmental limitations, to determine the most appropriate and sustainable use for a specific area. By following this classification, land managers can ensure that farming practices do not lead to long-term degradation or soil erosion. This approach is essential for protecting natural resources and ensuring that the land remains productive for future generations in a sustainable way.

213. (C) Great Britain / Western Europe
The Industrial Revolution first began in Great Britain and then spread across Western Europe during the late eighteenth and early nineteenth centuries. This period was marked by a fundamental shift from manual labor to machine-based manufacturing, fueled by the invention of the steam engine and the use of coal. These changes transformed societies from agrarian economies into industrial ones, leading to massive urbanization and the growth of new industrial regions. This historical process laid the foundation for the modern global economy and shaped the spatial distribution of manufacturing for decades.

NODIA

214. (C) Statement I is true, but Statement II is false.
Globalisation has significantly increased the speed and volume of capital, goods, and information flowing across international borders. However, it is incorrect to suggest that the movement of labor is just as free and unrestricted. While capital and goods often face fewer barriers, the international migration of labor remains highly regulated by national immigration policies, visas, and work permits. This unequal degree of mobility between different factors of production is a major characteristic of the current phase of globalization, creating significant challenges and debates regarding international economic policy and human rights.

215. (D) footloose industry.
A software development firm that can serve global clients from a single location without being tied to specific raw materials or high transport costs is a classic example of a footloose industry. Such businesses are characterized by their extreme flexibility in choosing a site because their primary inputs and products are digital. They tend to locate in areas that offer other benefits, such as a skilled workforce or a high quality of life for employees. This independence from traditional resource-based constraints is a defining feature of modern knowledge-based industries in the globalized digital economy.

216. (A) 2, 3, 4, 1
The theories of regional development have emerged in a specific chronological order. Gunnar Myrdal's theory of cumulative causation gained prominence in the late nineteen-fifties. Shortly after, Albert O. Hirschman's ideas

nodal region. This type of region is organized around a central focal point, which acts as a hub for interactions and movements, in this case, the air travel needs of the surrounding population. The boundaries of the region are determined by the reach of the interaction and the influence of the node. Analyzing such regions is essential for urban and transport planning and for understanding how major infrastructure hubs serve and connect their broader geographic territories within a national system.

230. (B) land rent, which is a function of market price, production cost, and transport cost.
In Von Thunen's model, the primary determinant of land use is land rent, which represents the potential profit a farmer can make from a specific area. This rent is calculated based on the market price of the crop, the cost of production, and the cost of transporting the product to the central market. Since transportation costs increase with distance, the land rent for intensive activities decreases as a farm is located further away. This economic logic leads to the formation of distinct rings where different agricultural activities are practiced based on their relative profitability at various distances.

231. (B) 1, 2 and 3 only
Major world industrial regions are geographically concentrated in a few key areas that drive the global manufacturing economy. The Ruhr Valley in Germany is a classic resource-based region, while Silicon Valley in the USA represents a modern high-technology hub. The Kanto Plain in Japan is another major, diversified industrial center. These regions are characterized by a dense concentration of industries and infrastructure. It is incorrect to suggest that industrial regions are evenly distributed globally; instead, they reflect a pattern of significant spatial concentration in the Global North and parts of Eastern Asia.

232. (A) Geography of Transport and Trade
Connectivity and accessibility are fundamental concepts in the geography of transport and trade. Connectivity measures the number and directness of links within a network, while accessibility describes how easily a specific location can be reached from other points. These metrics are essential for analyzing the efficiency of transportation systems and the spatial integration of different regions. By understanding these concepts, geographers can provide valuable insights into the movement of goods, people, and information, and how transportation infrastructure contributes to economic development and regional connectivity in a globalized world system.

233. (C) increased regional divergence and inequality.
In Gunnar Myrdal's theory of cumulative causation, backwash effects lead to increased regional divergence and inequality. These processes occur when a growing core region attracts the best labor, capital, and resources from the surrounding periphery. This outflow further weakens the poorer regions while accelerating the growth and dominance of the core. While some positive spread effects may occur, they are often too weak to overcome the initial disparities. This results in a self-reinforcing cycle where spatial inequalities within a country tend to grow over time rather than naturally diminishing through market forces alone.

234. (A) Both Statement I and Statement II are true.
Intra-regional trade offers significant prospects for stimulating growth by creating larger markets and encouraging cooperation. However, it also faces significant hurdles, particularly among developing nations with similar economic structures. Because these countries often produce the same primary commodities, their economies are competitive rather than complementary. This competition limits the opportunities for mutual exchange within the region. Overcoming this problem requires diversifying their economies and finding unique areas of specialization where they can cooperate more effectively to achieve shared benefits and promote long-term stability and regional economic growth in the global market.

235. (D) the weight of the raw materials and final product.
Industries are typically classified as heavy or light based on the weight and bulkiness of the raw materials they use and the final products they create. Heavy industries, such as steel manufacturing or shipbuilding, involve large quantities of heavy inputs and produce bulky outputs. In contrast, light industries, such as electronics or garment manufacturing, use

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and for explaining why physical proximity often leads to higher levels of interaction between locations.

223. (A) mineral-based industry.
In industrial classification, a cement factory is categorized as a mineral-based industry because its primary raw materials, such as limestone, gypsum, and clay, are minerals extracted from the earth. These industries process non-living, inorganic matter to create finished products for construction and other uses. Identifying these raw material linkages is important for understanding the spatial relationship between industrial locations and the geological features that provide their necessary inputs. This classification helps in analyzing the economic structure and resource dependencies of different industrial regions and their overall developmental stage.

224. (B) NATO
Global economic blocs are groups of countries that coordinate their economic policies and reduce trade barriers among themselves, such as the European Union, ASEAN, and USMCA. These groups aim to promote economic integration and regional stability. In contrast, NATO is primarily a military and political alliance focused on collective defense and security. While it involves cooperation between nations, its core function is not economic or trade-related. Distinguishing between these different types of international organizations is essential for understanding the diverse ways in which countries cooperate to address shared challenges in the global system.

225. (B) P-4, Q-1, R-3, S-2
Agricultural geography has been shaped by several key scholars who developed different methods for analyzing land use. J.C. Weaver introduced a statistical approach using standard deviation for crop combinations. K. Doi modified this by using the simpler sum of squared differences. S.M. Rafiullah further refined these techniques by introducing the maximum positive deviation method. Much earlier, Von Thunen developed a pioneering model of concentric agricultural rings based on land rent and transport costs. Together, these scholars provide a comprehensive set of tools for understanding the complex spatial organization of agriculture and land use.

226. (A) Knowledge Economy.
The rise of the knowledge economy is a defining feature of modern economic development, where growth is increasingly driven by intellectual capital, innovation, and advanced technology. In this stage, industries focused on education, information technology, and research and development become the primary sources of value and competitive advantage. This transition reflects a move away from traditional manufacturing and resource extraction toward a post-industrial system where the creation and strategic use of knowledge are recognized as the most critical factors for national and global progress in the increasingly complex digital age.

227. (C) natural resource management.
The tragedy of the commons is a fundamental concept in natural resource management that explains the tendency of shared resources to be overexploited. This occurs when individual actors, pursuing their own short-term self-interest, deplete a common resource, such as international fisheries or public pastures, even when it is clear that its exhaustion will harm the entire group in the long run. Without enforceable regulations or collective agreements, the lack of private ownership leads to unsustainable use. This process poses a significant challenge for preserving ecosystems and ensuring the long-term viability of shared natural assets.

NODIA

228. (A) Both A and R are true and R is the correct explanation of A.
The formation of regional trade blocs can sometimes act as a barrier to global free trade. While these blocs encourage integration among their members by reducing internal tariffs, they may simultaneously raise or maintain common external tariffs against non-member countries. This creates a situation where trade is diverted toward members and away from more efficient producers outside the bloc. While regional cooperation can promote internal growth, it also highlights the potential for discriminatory trade policies that can hinder the broader goal of an open and equitable global trading system for all nations.

229. (C) functional region.
A region defined by the area served by a particular airport is a classic example of a functional or

located further away, making land less profitable for intensive activities. The model assumes that because soil fertility and climate are uniform everywhere, the only variable that affects the profitability of land is the cost of moving products to the market. This economic logic leads to the formation of distinct concentric rings of different agricultural activities around the center.

204. (B) Arid and semi-arid lands
Nomadic herding is an agricultural system that is specifically adapted to arid and semi-arid environments where permanent farming is often impossible due to a lack of water. Herders move their livestock, such as sheep, goats, and camels, over large areas in search of seasonal pastures and water sources. This mobile lifestyle allows them to exploit the limited and scattered resources of dry regions effectively. It is a traditional and highly resilient way of life that remains an important part of the socio-economic and cultural landscape of many desert and grassland areas worldwide.

205. (C) firms move away from a crowded, expensive industrial cluster due to rising costs and congestion.
Deglomeration is the process where industries and businesses begin to move away from a crowded and over-concentrated industrial cluster. This usually happens when the costs of operating in that area, such as high rents, labor shortages, and traffic congestion, begin to outweigh the benefits of agglomeration. Firms may relocate to smaller towns or suburban areas where costs are lower and there is more space for expansion. This process helps in decentralizing economic activity and can lead to the growth of new industrial centers and more balanced regional development.

206. (D) 1, 2, 3 and 4
The location of an industry is determined by a complex interplay of several factors, including access to raw materials, the cost and availability of labor, and proximity to major markets. Additionally, government policies, such as subsidies or environmental regulations, and political stability play a critical role in shaping the spatial distribution of manufacturing. Together, these factors influence the total production and transport costs of a firm, determining where it can operate most efficiently and profitably. Understanding these variables is essential for analyzing the industrial geography of any specific region.

207. (A) Breaking-Point model.
The Breaking-Point model is a variation of the Gravity Model used to predict the boundary between the market areas of two competing centers. It identifies the geographic point between two towns where a consumer would be indifferent to shopping in either one. This model accounts for the fact that larger towns have a greater pull, so their market areas will extend further than those of smaller towns. Analyzing these breaking points is essential for retail planners and for understanding the functional organization of urban systems and regional service areas.

208. (B) knowledge-based economy.
The increasing importance of higher education and research and development as leading industries signifies a fundamental shift toward a knowledge-based economy. In this stage of development, economic growth is driven by intellectual capital and innovation rather than by physical labor or the extraction of raw materials. Information technology and the production of new knowledge become the primary sources of value and competitive advantage. This transition reflects the maturing of modern societies into post-industrial systems where the quaternary sector becomes the most critical driver of national and global progress.

209. (B) can be seen as overly deterministic, downplaying the agency of developing nations.
A primary criticism of dependency theory is that it can be seen as overly deterministic by focusing almost exclusively on external structural factors for underdevelopment. Critics argue that this perspective downplays the internal agency and potential for positive change within developing nations themselves. By emphasizing the role of global exploitation, the theory may overlook the impact of domestic policies, cultural factors, and the successes of certain countries that have achieved rapid growth within the global system. This debate highlights the complexity of explaining regional disparities and the diverse factors involved.

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smaller amounts of lightweight materials. This classification is important for understanding the transportation needs and spatial patterns of different manufacturing sectors, as the weight of materials significantly impacts the choice of an optimal and cost-effective industrial location.

236. (A) 1, 2, 3, and 5
Regional development is shaped by several key concepts, including formal and functional regions and the North-South divide. Theories such as Myrdal's cumulative causation and dependency theory explain the persistent spatial inequalities across the world. While Myrdal used spread and backwash effects to describe regional divergence, dependency theory focuses on the exploitative structural relationship between core and periphery nations. It is incorrect to suggest that regional inequalities naturally decrease over time; instead, they often require active policy intervention. Understanding these diverse perspectives is essential for analyzing the complex and often uneven processes of global and regional development.

237. (C) total interaction potential of one location with respect to all other locations in a system.
The Potential Model is a variation of the Gravity Model used to calculate the total interaction potential of a single location relative to all other points within a geographic system. It measures the accessibility and central importance of a place by summing its relationships with all other locations, considering their size and the distance between them. This model helps geographers understand which locations are most central and well-connected within a network. Analyzing interaction potential is essential for urban planning, retail location decisions, and for studying the overall spatial structure of a territory's economy.

238. (D) costs exceed revenues, resulting in a loss.
In D.M. Smith's spatial margins to profitability model, a location outside the margin is one where the total production and transportation costs exceed the total revenue generated by the firm. Operating at such a site would result in an economic loss, making it inviable for a sustainable business. The margins delineate the geographic area within which a business can survive and earn a profit. This concept highlights that while there may be one optimal point for profit maximization, several other locations within the margins remain viable choices for an entrepreneur in a competitive market.

NODIA

239. (A) the revolution in information and communication technology (ICT) and transportation.
The recent phase of globalization has been primarily facilitated by a massive revolution in information and communication technology and transportation. These advancements have drastically reduced the barriers of time and space, allowing for the rapid and low-cost movement of goods, services, capital, and information across the entire globe. The growth of the internet and high-speed transport networks has enabled the fragmentation of production and the integration of national economies into a single global market. This technological progress is the key driver of the increasing interconnectedness and interdependence of regions in the contemporary world.

240. (B) perceptions of regional neglect, underdevelopment, and inequitable resource distribution.
The demand for the creation of Telangana in India was a prominent example of a social movement driven by perceptions of deep-seated regional neglect and underdevelopment. Proponents argued that the region's resources and opportunities were being diverted to other parts of the state, leading to significant socio-economic disparities. This movement reflected a desire for better local governance and a more equitable allocation of resources to address the specific needs of the local population. It highlights the complex link between geography, economic aspirations, and political representation, showing how regional identities can become a powerful force for social change.

241. (B) Alfred Weber
A baker's decision to locate near customers because bread is a weight-gaining product aligns with the principles of Alfred Weber's industrial location theory. Weber argued that for weight-gaining industries, transportation costs are minimized by situating the factory close to the market to avoid the high expense of shipping a heavier final product. This least-cost approach

provides a mathematical basis for understanding how the relative weight of raw materials and final goods shapes industrial patterns. Weber's model remains a fundamental tool for explaining the spatial distribution of manufacturing based on the efficiency of transportation costs.

242. (A) Food processing
The primary sector of the economy focuses on the direct extraction or harvesting of natural resources, including agriculture, mining, and forestry. These activities represent the most basic level of production. In contrast, food processing is considered a secondary economic activity because it involves the physical transformation of raw agricultural products into finished goods. While the primary sector provides the necessary raw materials, the secondary sector adds value through manufacturing and industrial processes. Distinguishing between these sectors is essential for analyzing the economic structure and developmental stage of a country or its specific geographic regions.

243. (C) the "where" of economic activity.
The spatial organization of economic activities refers specifically to the geographic distribution or the where of these activities across the earth's surface. It examines the patterns of where production, exchange, and consumption occur and the factors that influence these location choices. This is the core subject matter of economic geography, which analyzes how economic systems are organized in space and how they interact with the physical and human environment. Understanding spatial organization is essential for studying regional development, international trade, and the complex ways in which human societies utilize and organize geographic space.

244. (D) ensure rational, orderly, and efficient use of land resources.
The main function of land use planning is to ensure that land resources are utilized in a rational, orderly, and efficient manner. This strategic process involves organizing the physical environment to achieve various social, economic, and environmental goals while resolving conflicts between competing claims, such as agriculture, industry, and urban housing. By implementing systematic plans, geographers and planners can protect natural resources, improve infrastructure, and promote sustainable development. Effective land use planning is essential for preventing haphazard growth and enhancing the overall quality of life for the population in a specific geographic region.

245. (C) Power-oriented
An industry that is located near a source of cheap electricity, such as an aluminum smelter, is considered a power-oriented industry. Because electricity is a major part of the production cost and cannot be transported over very long distances without significant loss, locating close to a power plant or a major hydroelectric source is economically essential. This orientation is a key factor in industrial location theory for explaining the spatial distribution of energy-intensive manufacturing. Access to reliable and inexpensive power is a critical determinant of profitability for many heavy industries in the modern global economy.

246. (B) Myrdal's Cumulative Causation
Gunnar Myrdal's theory of cumulative causation explicitly identifies spread and backwash effects as the primary mechanisms through which regional inequalities are created and reinforced. Backwash effects involve the outflow of resources from the periphery to the core, while spread effects represent the diffusion of growth and innovation in the opposite direction. This theory explains why economic activity tends to concentrate in a few locations, leading to persistent and growing spatial disparities. Myrdal used these concepts to challenge the idea that market forces naturally lead to regional convergence, highlighting the need for active policy intervention to promote balanced development.

247. (D) quantify the structure and efficiency of transport networks.
The primary purpose of using various measures and indices of connectivity and accessibility is to quantify the structure and efficiency of transport networks. Indices such as the Beta and Gamma Index allow geographers to objectively analyze how well-connected a network is and how easily different locations can be reached. This quantitative approach is essential for urban and transport planning, as it provides a rigorous way to evaluate infrastructure development

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and the spatial integration of regions. By understanding these metrics, researchers can better analyze the movement of goods and people and how transportation systems drive economic development.

248. (A) a formal, institution-based trade regulation system with a dispute settlement mechanism.
The transition from the General Agreement on Tariffs and Trade to the World Trade Organisation signified a shift toward a more formal and institutionalized global trade system. Unlike GATT, which was a multilateral agreement with no central structure, the WTO is a permanent international body with significant power to enforce trade rules. A key feature is its dispute settlement mechanism, which provides a legal framework for resolving conflicts between member countries. This transition created a more predictable and robust environment for international trade, expanding regulation to include services and intellectual property in the complex modern global economy.

249. (C) the level of access to credit, technology, and market information.
A major determinant of regional variations in agricultural productivity is the level of access that farmers have to essential resources like credit, modern technology, and market information. While environmental factors are important, the ability to invest in high-quality seeds, fertilizers, and irrigation systems directly impacts crop yields. Disparities in these socio-economic and institutional factors can lead to significant imbalances in productivity within a country. Ensuring that all regions have equitable access to these resources is essential for promoting balanced agricultural development and improving food security for the broader population in a diverse national system.

250. (A) differences in their specific ability to use and interpret the information.
According to Allan Pred's behavioral approach, the location decisions made by entrepreneurs are shaped by their unique ability to perceive and interpret information. Even when faced with identical geographic and economic conditions, two individuals may choose different sites because their cognitive abilities, past experiences, and personal goals vary. This perspective acknowledges that human decision-making is not always perfectly rational or optimal. By emphasizing the role of the decision-maker, Pred's model provides a more realistic understanding of industrial location patterns, showing how individual behavior and perceptions contribute to the complex spatial organization of economic activities in the real world.

251. (B) The primary sector due to its dependence on natural resources.
Primary activities are deeply rooted in the geographical placement of specific natural elements like fertile soil, mineral deposits, and suitable climates. Because agriculture and mining rely on these fixed environmental factors, their spatial patterns are essentially determined by physical geography. This direct link makes the primary sector the most environmentally dependent compared to manufacturing or service-oriented economic sectors.

252. (A) Access to a sufficient consumer base.
Tertiary activities operate within the service sector and focus on providing offerings directly to people. Consequently, they are inherently market-oriented and typically cluster in urban environments where high population density provides a reliable and accessible consumer base. This concentration ensures that businesses have the necessary volume of local customers required to sustain their operations and achieve economic viability.

253. (C) A combination of multiple influencing factors.
Secondary economic activities involve manufacturing and processing, allowing for significantly more locational flexibility than primary industries. Their spatial organization results from balancing various complex elements, including the proximity to raw materials, availability of skilled labor, and access to energy. Additionally, factors like transportation infrastructure and closeness to markets play critical roles in determining the most efficient industrial sites.

254. (D) A simultaneous dispersal due to technology and concentration for knowledge spillovers.
Quaternary activities focus on information processing and research, traditionally clustering

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in major metropolitan hubs near universities. Advancement in communication technology now allows for some spatial dispersal across different regions. However, the ongoing necessity for face-to-face interactions and the benefits of knowledge spillovers continue to reinforce their concentration within specific high-tech clusters. This creates a distinct dual locational trend.

255. (C) Increases, but with certain centralising tendencies.
As economic sectors transition from primary to quaternary, they generally become less tethered to specific physical landscapes, leading to higher locational flexibility. While technology enables wider dispersal, certain industries still exhibit strong centralizing tendencies due to the need for infrastructure, human capital, or urban markets. This complexity reflects a balance between the freedom to move and the advantages of concentration.

256. (B) Economic disparities and geopolitical tensions.
Natural resources are spread unevenly across the globe, which leads to significant imbalances in wealth and development between different nations. This geographical variation often causes economic disparities, as some regions possess valuable assets while others do not. Furthermore, the concentration of critical resources like fossil fuels frequently results in geopolitical tensions as countries compete for control and secure supply.

257. (D) Resource-rich countries may face challenges like slower economic development.
The resource curse describes a paradoxical situation where nations possessing abundant natural resources often experience stagnating or slower economic growth. This phenomenon can occur due to various factors, including over-reliance on a single commodity, economic mismanagement, or neglect of other sectors. Consequently, resource wealth does not always translate into broad prosperity and can lead to significant developmental challenges for nations.

258. (A) Developed countries focus on supply security, while developing countries struggle with basic energy access and affordability.
The global energy crisis presents distinct challenges depending on a nation's level of development. Advanced economies, characterized by high per capita consumption, primarily worry about securing energy supplies and transitioning toward renewable sources. In contrast, many developing nations face a fundamental crisis concerning basic access and affordability. This lack of modern energy services severely hinders their social and economic development.

259. (C) Promote the sustainable and equitable use of resources.
Natural Resources Management has emerged as a vital discipline dedicated to overseeing how environmental assets are utilized globally. The primary objective of this field is to ensure that resource extraction and consumption are both sustainable for future generations and equitably distributed among populations. This approach balances economic needs with environmental preservation while addressing regional development requirements and global sustainability goals.

260. (A) Market value (high/low).
Geographic classification of natural resources typically relies on objective physical and developmental attributes. Common criteria include the origin of the resource, categorized as biotic or abiotic, and its level of exhaustibility, such as renewable or non-renewable. Resources are also classified by their current stage of development, ranging from potential to actual. However, market value is not used as a primary criterion.

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261. (D) August Lösch.
August Lösch contributed significantly to industrial geography by moving away from simple cost-minimization models. His approach emphasized a maximum-profit perspective, focusing on the identification of the most advantageous market area for a business. By seeking the location that could command the largest possible consumer base, his model aimed to maximize total revenue rather than just focusing on reducing transportation or labor.

262. (B) A behavioral approach involving imperfect information and satisficing decisions.
Allan Pred introduced a behavioral dimension to location theory, challenging the assumption that

economic actors always make perfectly rational choices. He argued that decision-makers often possess imperfect information, leading them to choose locations that are satisfactory rather than mathematically optimal. This concept, known as satisficing behavior, acknowledges that human limitations and personal perceptions play a critical role in shaping industrial geography.

263. (C) There exists a geographical zone within which a firm can achieve profitability.
The concept of spatial margins to profitability involves synthesizing considerations of both costs and revenue. This framework suggests that there is not just one perfect location for an industry, but rather a broader geographical area or zone of feasibility. As long as a firm operates within these spatial margins, it can maintain profitability, whereas operating outside them results in financial losses.

264. (D) By identifying the point of minimum aggregate costs, especially for transport.
Alfred Weber's foundational theory of industrial location is a least-cost model that prioritizes efficiency. It identifies the optimal site for a factory by determining the point where the total costs of transporting raw materials and finished products are minimized. While his model also considers labor costs and agglomeration effects, the primary goal remains finding the location that offers the lowest aggregate expenditure.

265. (A) Weber focuses on costs, while Lösch focuses on revenue and market area.
A fundamental distinction exists between the theoretical frameworks of Alfred Weber and August Lösch. Weber's model is primarily concerned with minimizing expenditures, specifically transportation and labor costs, to find efficient sites. Conversely, Lösch's approach prioritizes revenue maximization by analyzing market areas. He seeks locations providing the greatest sales potential rather than solely focusing on reducing costs for the business.

266. (B) To objectively delineate crop combination regions.
Statistical techniques developed to analyze agriculture are designed to bring objectivity to the field. The primary goal is to create a reliable method for delineating crop combination regions based on actual land use data. These quantitative pathways allow geographers to map and define the dominant agricultural characteristics of various areas by analyzing the diversity and distribution of cultivated crops.

267. (B) By using the sum of squared differences, which simplified the computation.
Kazuko Doi refined pioneering statistical work to make it more practical for geographical analysis. While original methods were statistically sound, they often required intensive and complex calculations. Doi modified this approach by using a simplified sum of squared differences of crop percentages. This change retained the statistical robustness of the technique while making the computations much easier to perform manually.

268. (A) Statistically robust but computationally intensive.
J.C. Weaver's method for identifying crop combination regions represented a significant advancement in quantitative agricultural geography. His pioneering technique calculates the deviation of actual crop areas from a theoretical distribution to find accurate combinations. While the method is widely respected for its statistical robustness and objective results, it is also known for being computationally intensive, requiring detailed mathematical steps.

269. (C) S.M. Rafiullah.
S. M. Rafiullah proposed a specific modification to the methods used for delineating agricultural regions. His technique focused on identifying the maximum positive deviation by comparing actual percentage distributions with a theoretical model based on a geometric progression. This approach improves the accuracy of crop combination results, particularly in complex regions where a high number of different crops are grown.

270. (D) Reliance on a statistical approach to define regions.
Although various researchers developed different specific procedures, their methods share a fundamental characteristic. Each utilize a rigorous statistical approach to provide an objective way of defining agricultural regions. By moving away from qualitative descriptions and relying on mathematical calculations of crop areas, these techniques ensure that the mapping

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diminishes. The edge of the region is reached where these interactions are no longer strong enough to maintain functional connectivity between the areas.

289. (D) Framing global divides as a core-periphery structure of dominant and dependent functional regions.
Global economic divides are conceptualized as a core-periphery structure involving dominant and dependent functional regions. In this framework, core regions function as the primary nodes of the global economy, characterized by high levels of integration and power. Conversely, peripheral regions exhibit weaker economic integration and dependency, highlighting how functional relationships between different world regions drive significant spatial disparities.

290. (A) Formal regions are defined by homogeneity, while functional regions are defined by interaction.
The primary distinction between the two types of regions lies in their defining criteria. Formal regions are based on homogeneity, meaning the area shares common, uniform characteristics like climate or language. In contrast, functional regions are defined by interaction, focusing on the connections and movements between a central hub and its surrounding area. This difference is fundamental to regional classification.

291. (C) To provide a rules-based framework and forum for negotiating international trade.
The World Trade Organisation is a central institution in the global economy, serving to regulate and facilitate international commerce. Its primary function is to establish and maintain a rules-based framework that governs how member nations conduct trade with one another. Furthermore, it acts as a vital forum for negotiating new trade agreements and resolving disputes, thereby promoting smoother commerce.

292. (A) The removal or reduction of state restrictions on trade and investment.
Liberalisation is a specific economic process that often accompanies globalisation. It involves the deliberate removal or reduction of state-imposed barriers that limit the movement of goods, services, and capital across national borders. Common examples of such restrictions include tariffs and quotas. By reducing these constraints, liberalisation aims to foster more open markets and encourage increased levels of international trade.

293. (D) Lead to "trade diversion" that could conflict with the multilateral system.
While regional trade blocs can enhance cooperation among neighboring countries, they also present potential challenges for the global trading system. One significant risk is trade diversion, where trade shifts from efficient global producers to less efficient producers within the regional bloc due to preferential treatment. This can create conflicts with the broader multilateral trading system and global trade principles.

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294. (B) Technological advancements and reduced barriers to movement.
Globalisation is driven by a combination of technological progress and policy changes. Advancements in information technology and transportation have drastically lowered the cost and time required to move people, goods, and ideas around the world. Simultaneously, the reduction of state-imposed barriers to movement, such as trade restrictions, has further facilitated the increasing interconnectedness of economies and various societies.

295. (C) It has created complex global supply chains and increased trade volumes.
The forces of globalisation and liberalisation have significantly transformed the patterns of world trade. These processes have led to the development of highly complex global supply chains, where the production of a single good involves multiple countries. Additionally, the removal of trade barriers and improved technology have resulted in a substantial increase in the overall volume of international commerce.

296. (D) Availability of human capital and innovation ecosystems.
Knowledge-based industries, such as Information and Communication Technology and Research & Development, have unique locational requirements. Unlike traditional sectors, they are not tied to physical raw materials. Instead, their success depends heavily on the presence of high-quality human capital, consisting of a

of resources from less developed areas toward the more dominant growth centers, leading to increased spatial inequality in early development.

280. (D) Economic development initially tends to be spatially concentrated and uneven.
Economic development does not occur everywhere at once. Instead, it initially tends to be spatially concentrated and inherently uneven. This initial polarization creates core-periphery structures where growth is focused in specific nodes while other areas remain less developed. This foundational premise is widely accepted by various theorists who study the patterns and mechanisms of regional expansion and inequality.

281. (A) The interplay between transport costs and land rent.
Agricultural land-use patterns are determined by the relationship between the cost of transporting goods to a central market and the rent paid for the land. Land rent decreases as distance from the market increases, while transport costs rise. Farmers must choose the land use that maximizes profit, leading to a pattern where the most profitable crop prevails.

282. (A) Intensive farming and dairying.
In agricultural models featuring concentric zones, intensive farming and dairying are located in the ring closest to the central city. These activities produce high-value, highly perishable goods that require rapid transportation to the market. Because these products cannot withstand long travel times or high transport costs, they occupy the land where accessibility to urban consumers is the greatest.

283. (C) A uniform plain with no topographical barriers.
Certain models rely on simplifying assumptions to isolate the impact of distance on land use. A fundamental assumption is that the central city exists within an isolated state characterized by a uniform, featureless plain. This environment has no topographical barriers, varied soil fertility, or alternate markets. Such a simplified landscape allows for the emergence of perfectly concentric agricultural patterns.

284. (D) Because wood is heavy and has high transport costs relative to its value.
In historical economic contexts, wood was essential for both fuel and construction. Because timber is heavy and difficult to move, it incurs very high transportation costs relative to its market value. To minimize these expenses, forestry was traditionally located in the second ring, relatively close to the city, rather than in more distant zones used for extensive ranching.

285. (A) Different crops have different abilities to bear transport costs and pay for land.
Concentric zonation emerges because different agricultural activities have varying economic characteristics. Each crop or product has a specific market price, production cost, and transportation requirement. The resulting land-use pattern is determined by which activity can afford to pay the highest land rent at any particular distance from the market, after accounting for all associated costs of transporting goods.

286. (D) A region where the majority of the population speaks French.
A formal region is defined by the widespread presence of one or more measurable or observable characteristics that are uniform across the area. A linguistic region, such as one where the majority of people speak French, fits this definition perfectly. The boundaries of this region are drawn where the defining feature, in this case the language, is no longer dominant.

287. (C) A system of interactions organized around a central node.
Unlike formal regions based on homogeneity, functional regions are defined by a system of interactions and movements. These regions are organized around a central node or hub that serves as the focal point for various activities. The surrounding hinterland is linked to this core through flows of people, goods, or information, such as commuting patterns or service areas.

288. (A) The intensity of the organizing flow or interaction significantly decreases.
The boundaries of a functional region are determined by the reach of its central node. As one moves further away from the hub, the intensity of the organizing flow, such as trade, communication, or commuting, gradually

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(C) The natural and inevitable sorting of people into different economic classes based on performance.
(D) The process by which individuals or groups are systematically blocked from rights, opportunities, and resources.

15. The 'Rimland Theory' posits that control over which area is key to controlling the "World-Island"?
(A) The maritime fringes of Eurasia
(B) The interior of Eurasia
(C) The North Polar region
(D) The continent of Africa

16. Consider the following statements and select the correct option.
Statement I : A cultural complex is a group of individual cultural traits that are functionally interrelated.
Statement II : A single cultural trait, such as the use of a specific tool, cannot be part of a larger cultural complex.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

17. Arrange the following geopolitical concepts in the correct chronological order of their proposition.
1. Rimland Theory
2. Geopolitics of Climate Change
3. Heartland Theory
4. Neopolitics of World Natural Resources

Which of the following is the correct order?
(A) 1, 3, 2, 4
(B) 3, 1, 4, 2
(C) 3, 2, 1, 4
(D) 1, 4, 3, 2

18. Identify the incorrect pair regarding the spatial distribution of language families in India.
(A) Sino-Tibetan languages - Gujarat and Rajasthan
(B) Indo-Aryan languages - Northern and Central India
(C) Dravidian languages - Southern India
(D) Austro-Asiatic languages - Meghalaya and Nicobar Islands

19. A public health official is mapping the outbreak of a water-borne disease in a city. They notice the highest concentration of cases in neighborhoods with poor sanitation and a lack of access to clean drinking water. This analysis is a direct application of the principles of:
(A) Cultural Convergence
(B) Geopolitics of Climate Change
(C) Disease Ecology
(D) Electoral Reforms

20. Which of the following is the most appropriate central theme in the 'Geography of Federalism'?
(A) The analysis of international maritime treaties and strategic alliances between sovereign nations.
(B) The examination of voting patterns and demographic shifts in a single national election cycle.
(C) The historical evolution and geographical spread of monarchical systems and territorial claims.
(D) The study of the spatial expression of political power division between national and sub-national governments.

21. Consider the following components related to the study of geography:
1. Concept of Culture
2. Social Well-being and Quality of Life
3. Spatial distribution of social groups
4. Geopolitics of World Resources
5. Heartland and Rimland Theories

Which of the above are key components of studying 'Cultural and Social Geography'?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 3, 4 and 5
(D) 1 and 2 only

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22. In political geography, what is a 'Boundary'?
(A) A broad zone of transition between two states, often uninhabited.
(B) A thin, imaginary line that marks the limit of a state's sovereign territory.
(C) A conceptual line dividing the earth's core from its mantle.
(D) A cultural region with no political significance.

skilled workforce. Furthermore, they thrive in innovation ecosystems that support creativity, collaboration, and advanced information exchange.

297. (A) Highly concentrated in specific metropolitan and innovation hubs.
The world distribution of quaternary industries like Information Technology and Research & Development is characterized by high levels of spatial concentration. These activities favor major metropolitan areas in developed nations and specific emerging innovation hubs. These locations provide the necessary digital infrastructure and the ability to attract highly skilled workers, creating a geography where economic power centers in nodes.

298. (B) Increased leisure time and improved transportation.
The rapid growth of the global tourism industry is fueled by several socioeconomic factors. Rising disposable incomes allow more people to afford travel, while a general increase in leisure time provides the opportunity for vacations. Additionally, significant improvements in transportation technology and infrastructure have made long-distance travel faster and more accessible, allowing tourism to become a major global force.

299. (B) As quaternary industries.
Industries focused on information processing, higher education, and Research & Development are classified as quaternary activities. This sector represents an advanced stage of economic development following the tertiary stage. Quaternary industries are distinct because they deal specifically with the production, management, and dissemination of knowledge and information, rather than physical goods or basic services, reflecting a knowledge-based economy.

300. (A) Geographically uneven and competitive.
Both the knowledge production and tourism industries exhibit a common pattern in their global distribution. They are geographically uneven, clustering in specific areas that offer particular advantages, such as innovation ecosystems or natural and cultural attractions. Furthermore, both sectors are highly competitive, with regions constantly vying to attract investment, skilled talent, and visitors to bolster their economic standing.

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of dominant agricultural patterns is based on empirical data and logic.

271. (C) The feasibility and cost associated with moving a good between locations.
In the framework of spatial interaction, transferability is a critical factor that determines whether movement between places will occur. It refers specifically to the feasibility and economic cost involved in transporting goods or commodities. Even if a demand exists in one region and a supply in another, interaction may not happen if the transportation costs are prohibitively high or difficult.

272. (B) The sizes of both centers increase.
The Gravity Model is used to predict the volume of interaction between two geographical locations. According to its mathematical logic, the flow of goods, people, or information is directly proportional to the size of the centers involved, often measured by population. Therefore, if the size of both centers increases, the potential for interaction between them rises quite significantly over time.

273. (D) Complementarity.
Complementarity is one of the essential bases for spatial interaction. It occurs when one region has a surplus of a specific commodity that is actively demanded by another region. In a trading scenario, even if a closer partner exists, interaction will only be established with the partner that possesses the required goods, thereby creating a functional economic link.

274. (A) City Y, located between X and Z, begins to offer the same goods as Z.
Intervening opportunity is a concept explaining how the presence of a closer alternative can disrupt interaction between two distant locations. If a new source for a desired commodity emerges at a location between the original supplier and the consumer, the flow of goods will likely shift to the nearer option. This reduces the interaction volume with the distant partner.

275. (B) Analyzing the movement and flow between places.
Both the interaction framework and the Gravity Model serve as vital tools for geographers studying spatial dynamics. These models are primarily used to analyze and predict the movement and flow of goods, people, and information across different locations. By understanding these interactions, researchers can measure the level of connectivity and accessibility within a transport, trade, or social network.

276. (A) Regional disparities tend to worsen due to self-reinforcing growth in core areas.
The theory of cumulative causation argues that spatial economic inequalities are not self-correcting but tend to intensify over time. Once a prosperous region begins to grow, it triggers a self-reinforcing cycle that attracts capital and talent. This growth in the core often happens at the expense of the periphery, leading to an increasing gap between developed and underdeveloped areas.

277. (D) Draining of capital, labor, and enterprise from the periphery to the core.
Backwash effects describe the negative consequences that the growth of a prosperous core region has on its surrounding periphery. These effects occur as the core region attracts vital resources, including investment capital, skilled labor, and entrepreneurial talent, away from less developed areas. This process depletes the periphery of assets needed to grow, thereby exacerbating existing regional inequalities and disparities.

278. (B) The eventual dominance of "trickle-down effects" stimulating the periphery.
Unbalanced growth theories suggest that prosperity in core areas will eventually spread to the periphery. While growth is initially concentrated, trickle-down effects emerge as industries in the core seek new markets or as congestion forces development outward. This process helps to stimulate economic growth in less developed regions, leading to a more optimistic view of eventual regional economic convergence.

279. (C) Polarization effects.
Economic growth naturally tends to cluster in specific locations. Polarization effects describe the process where investment and resources are concentrated in key sectors or regions. This concept is fundamentally similar to backwash effects, as both describe the initial draining

7. All of the following are considered determinants of electoral behaviour in India EXCEPT:
(A) Caste and religious affiliations
(B) Economic conditions and development issues
(C) Party manifestos and candidate profiles
(D) Universal longitude of the polling booth

8. What is the most appropriate description of 'Social Structure'?
(A) The patterned social arrangements in society that emerge from and determine the actions of individuals.
(B) The physical layout and architectural design of buildings and infrastructure within a localized society.
(C) The random and unorganized interactions that occur between different individuals in a specific community.
(D) The temporary and spontaneous gathering of people for a specific event or short-term social occurrence.

9. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The Geopolitics of the Indian Ocean are of increasing global significance.
Reason (R) : The Indian Ocean is a major conduit for international maritime trade and is rich in strategic resources.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

10. Which statement regarding Medical Tourism in India is incorrect?
(A) Medical tourism in India primarily attracts patients from developed Western countries only.
(B) India is a popular destination for medical tourism due to its low-cost, high-quality healthcare services.
(C) The growth of medical tourism is supported by the presence of highly skilled medical professionals.
(D) It contributes significantly to the foreign exchange earnings of the country.

11. What is the most likely cause-and-effect relationship in cultural ecology?
(A) Cause: High population density; Effect: Low level of cultural adaptation.
(B) Cause: Strong cultural heritage; Effect: Complete resistance to environmental changes.
(C) Cause: Introduction of new technology; Effect: Immediate loss of all traditional practices.
(D) Cause: A harsh physical environment; Effect: Development of specific adaptive cultural traits.

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12. Identify the correct pair related to the spatial distribution of social groups in India.
(A) The Bhil tribe - Primarily concentrated in the northeastern states.
(B) The Sikh population - Highest concentration in the state of Punjab.
(C) Speakers of Dravidian languages - Predominantly found in Northern India.
(D) The Christian population - Majority concentrated in the states of Rajasthan and Gujarat.

13. Consider the following statements regarding the Geography of Federalism:
1. It involves the study of the spatial organization and functioning of a state with multiple tiers of government.
2. It examines the causes and consequences of regionalism within a federal structure.
3. It analyzes the allocation of powers and resources between central and regional governments.
4. It exclusively focuses on unitary states and ignores federal systems.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

14. The term 'Social Exclusion' refers to:
(A) The psychological process by which individuals voluntarily isolate themselves from the rest of society.
(B) A governmental policy specifically aimed at integrating all members of society on an equal footing.

CHAPTER 07

Cultural, Social and Political Geography

1. Which of the following best defines the 'Concept of Culture' in geography?
(A) A group of diverse individual traits or characteristics that are functionally interrelated within a society.
(B) The specialized behavioral patterns, understandings, and adaptations that summarize the way of life of a group of people.
(C) The specific geographical area inhabited by a population group sharing a common and distinct cultural history.
(D) The complex blending and merging of different cultural traditions resulting from prolonged social interaction.

2. Read the following statements regarding Social Well-being and select the correct one.
(A) Social well-being is a composite measure of the quality of life, including factors like health, education, and social belonging.
(B) Social well-being is a purely fiscal concept exclusively measured by economic indicators such as per capita income levels.
(C) The concept of social well-being is a narrow-term metric, focusing primarily on individual levels of personal happiness.
(D) High social well-being is a demographic phenomenon always directly proportional to the population density of a region.

3. Who is credited with proposing the 'Heartland Theory' in political geography?
(A) Alfred Thayer Mahan
(B) Nicholas J. Spykman
(C) Halford J. Mackinder
(D) Friedrich Ratzel

4. Consider the following statements and select the correct option.
Statement I : Disease ecology primarily studies the interaction of the behavioural patterns of a population with environmental factors to understand disease causation and distribution.
Statement II : The study of disease ecology is independent of the cultural and social practices of a community.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

5. Match List I with List II regarding Regional Organisations of Cooperation and select the correct option using the codes given below.
List I: (Organisation)
P. SAARC
Q. ASEAN
R. OPEC
S. EU
List II: (Primary Geographic/Economic Focus)
1. Economic and political union of European countries
2. Management and stabilization of petroleum markets
3. Promotion of economic and social progress in South Asia
4. Acceleration of economic growth and social progress in Southeast Asia
Codes:
(A) P-3, Q-4, R-2, S-1
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-3, S-1

6. A geographer is studying how a traditional farming community in a semi-arid region has developed specific irrigation techniques and crop choices over centuries. This study best exemplifies the concept of:
(A) Cultural Convergence
(B) Cultural Ecology
(C) Cultural Heritage
(D) Social Exclusion

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23. Identify the correct statement about 'Health Care Planning and Policies in India'.
(A) Health care planning in India is exclusively managed and entirely controlled by private sector organizations.
(B) Indian health policies have historically focused on a centralized, rigid approach with no regional variation.
(C) India's health policies are purely administrative and do not address nutritional status or disease ecology.
(D) Health care policies in India aim to improve accessibility, affordability, and quality of health services for its population.

24. A city implements policies to build ramps, install elevators in public buildings, and provide special seating on public transport for physically challenged citizens. This action directly aims to reduce what social phenomenon?
(A) Social Exclusion
(B) Cultural Convergence
(C) Geopolitics
(D) Cultural Heritage

25. Match List I with List II regarding the spatial distribution of major religious groups in India and select the correct option using the codes given below.
List I: (Religious Group)
P. Buddhist
Q. Jain
R. Muslim
S. Parsi (Zoroastrian)
List II: (Area of significant concentration)
1. Gujarat, Rajasthan, Maharashtra
2. Jammu & Kashmir, Kerala, West Bengal
3. Maharashtra (Mumbai), Gujarat
4. Ladakh, Sikkim, Arunachal Pradesh
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-1, R-2, S-3
(C) P-2, Q-3, R-4, S-1
(D) P-4, Q-2, R-1, S-3

26. The concept of a 'Cultural Area' is best defined as:
(A) A region inhabited by people who have one or more cultural traits in common.
(B) A specific and singular geographical spot where a distinct cultural trait originated.
(C) The rapid global spread of a single culture into various international territories.
(D) A formal legal agreement signed between two distinct and separate cultural groups.

27. Consider the following statements and select the correct option.
Statement I : The Heartland theory identifies the "World-Island" as comprising the interlinked continents of Europe, Asia, and Africa.
Statement II : The theory argues that control of the seas is more important than control of land masses.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

28. The spread of global food chains, music, and fashion, leading to the adoption of similar cultural traits across different societies, is an example of:
(A) Cultural Ecology
(B) Cultural Convergence
(C) Cultural Heritage
(D) Social Structure

29. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The nutritional status of a population in India often exhibits spatial and seasonal patterns.
Reason (R) : The availability of food, types of crops grown, and prevalence of infectious diseases vary significantly across different regions and seasons in India.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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30. Which of the following would NOT be a primary focus of a geographer studying 'Environment and Human Health'?
(A) The correlation between air pollution levels and respiratory illnesses.
(B) The impact of contaminated water sources on the spread of cholera.
(C) The electoral behavior of citizens in a

specific constituency.
(D) The influence of climate on the prevalence of vector-borne diseases.

31. The study of the spatial distribution of castes in India falls under which sub-discipline of geography?
(A) Social Geography
(B) Political Geography
(C) Geomorphology
(D) Climatology

32. The 'Geopolitics of Climate Change' primarily examines:
(A) The physical science and chemical processes behind the atmospheric greenhouse effect.
(B) The potential for international conflict and cooperation arising from the impacts of climate change.
(C) The historical climate patterns and geological shifts of the ancient Paleozoic era.
(D) The seasonal migration patterns of birds driven by annual changes in global temperature.

33. Consider the following statements regarding 'Electoral Reforms in India':
1. They aim to make the election process more free, fair, and transparent.
2. They include measures like the introduction of Electronic Voting Machines (EVMs).
3. They address issues like criminalization of politics and the influence of money power.
4. They seek to replace the multi-party system with a two-party system.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

34. A person's sense of identity and connection to a group, based on shared customs, language, and history, is central to the concept of:
(A) Culture
(B) Quality of Life
(C) Social Exclusion
(D) Disease Ecology

35. The Rimland theory was proposed as a direct counter-argument to which earlier geopolitical theory?
(A) Sea Power Theory
(B) Organic State Theory
(C) Heartland Theory
(D) Geopolitics of Climate Change

36. Consider the following statements and select the correct option.
Statement I : Social well-being is a subjective concept that cannot be measured using objective indicators.
Statement II : Quality of Life includes both objective conditions (like income and housing) and subjective perceptions (like satisfaction and happiness).
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

37. A geographer studying the territorial disputes between India and its neighbours would be most concerned with the concepts of:
(A) Cultural Convergence and Social Well-being
(B) Disease Ecology and Nutritional Status
(C) Boundaries and Frontiers
(D) Electoral Behaviour and Federalism

38. Which of the following best represents a 'Cultural Heritage' site?
(A) A newly built shopping mall
(B) An ancient temple with unique architectural features
(C) A modern IT park
(D) A temporary agricultural market

39. The systematic denial of access to education and employment for a particular social group is a clear example of:
(A) Social Well-being
(B) Social Processes
(C) Cultural Convergence
(D) Social Exclusion

40. An analysis of how the political control over scarce water resources or oil reserves influences international relations falls under the study of:
(A) Neopolitics of World Natural Resources
(B) The study of human-environment

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relationships within Cultural Ecology.
(C) Electoral Reforms and voting patterns in a democratic society.
(D) The internal patterned arrangements of a given Social Structure.

41. Consider the following statements regarding the concept of a 'Frontier' in political geography:
1. It is a sharp, legally defined line.
2. It is a zone of separation, often with a unique cultural and economic character.
3. It is an area where state authority is not yet fully established.
4. Historically, it precedes the establishment of a fixed boundary.
5. It is identical in meaning to a 'Boundary'.

Which of the above statements are correct?
(A) 1 and 5 only
(B) 2, 3 and 4 only
(C) 1, 3 and 5 only
(D) 2 and 5 only

42. Etiological conditions in the context of nutritional status refer to:
(A) The causal factors leading to a particular nutritional disease.
(B) The geographical distribution of nutrients.
(C) The classification of food items based on calories.
(D) The seasonal pattern of food consumption.

43. Which regional organisation is primarily an association of petroleum-exporting countries?
(A) SAARC
(B) ASEAN
(C) EU
(D) OPEC

44. Consider the following statements and select the correct option.
Statement I : The spatial distribution of languages in India is uniform, with each state having only one language.
Statement II : The Indian Constitution recognizes a multiplicity of languages, reflecting the country's linguistic diversity.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

45. Match List I with List II regarding the geopolitical concept and select the correct option using the codes given below.
List I: (Geopolitical Concept)
P. Heartland
Q. Rimland
R. Federalism
S. Boundary
List II: (Associated Idea)
1. Division of power between central and regional units
2. Inner Eurasian landmass
3. A line marking the extent of state sovereignty
4. The maritime fringe of Eurasia

Codes:
(A) P-1, Q-3, R-2, S-4
(B) P-2, Q-4, R-1, S-3
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-3, R-1, S-4

46. When a city government invests in parks, community centers, and public libraries to improve residents' satisfaction and happiness, it is directly addressing:
(A) Geopolitics of the Indian Ocean
(B) Cultural Ecology
(C) Electoral Reforms
(D) Quality of Life

47. Which of the following is NOT a primary concern of 'Trends and Developments in Political Geography'?
(A) The analysis of rock formations and landforms.
(B) The rise of non-state actors in global politics.
(C) The impact of globalization on state sovereignty.
(D) The study of electoral geography and geopolitics of resources.

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48. The study of how the caste system in India has influenced settlement patterns and social interactions in villages is a key aspect of:
(A) Geopolitics of Climate Change
(B) Social Structure and Processes
(C) Heartland Theory
(D) Medical Tourism

49. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : Electoral reforms in India have

the reorganization of states.
3. The tribal population is predominantly urban.
4. Religion is a key element of social identity and has a distinct spatial pattern.
5. All social groups are evenly distributed across the country.

Which of the above statements are correct?
(A) 1, 2 and 4 only
(B) 3 and 5 only
(C) 1, 2, 3 and 4 only
(D) 1 and 5 only

122. Which of the following is the most suitable description of a 'Cultural Area'?
(A) The legal and administrative boundary of a sovereign state.
(B) A portion of the earth's surface occupied by people sharing recognizable and distinctive cultural characteristics.
(C) A specific and localized zone of active military or political conflict.
(D) A vast global network comprising various international financial institutions.

123. The Association of Southeast Asian Nations (ASEAN) is a regional organization whose geography is centered around:
(A) The Mediterranean Sea
(B) The lands between the Indian and Pacific Oceans
(C) The North Atlantic
(D) The South American continent

124. Consider the following statements and select the correct option.
Statement I : 'Social well-being' and 'Quality of Life' are identical concepts.
Statement II : 'Quality of Life' is a broader term that encompasses 'Social well-being' along with other factors like environmental quality and personal freedom.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

125. Match List I with List II regarding the political geography concept and select the correct option using the codes given below.
List I: (Political Geography Concept)
P. Geopolitics of Climate Change
Q. Geography of Federalism
R. Electoral Reforms in India
S. Geo-politics of India Ocean
List II: (Specific Topic)
1. Introduction of EVMs
2. Disputes over Sea Lanes of Communication (SLOCs)
3. International negotiations on carbon emissions
4. Centre-State relations and regionalism
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-4, R-1, S-2
(D) P-3, Q-1, R-4, S-2

126. The study of how different cultures modify their natural landscapes is a core theme of:
(A) Cultural Ecology
(B) Political Geography
(C) Social Exclusion
(D) Medical Tourism

127. Which of the following is a classic example of a 'determinant of electoral behaviour' in India?
(A) The direction of monsoon winds
(B) The caste affiliation of a candidate
(C) The location of the nearest international airport
(D) The geological structure of the region

128. The concept of 'Heartland' by Mackinder referred to a vast resource-rich region in:
(A) North America
(B) The core of the Eurasian landmass
(C) The Amazon Basin
(D) The Australian Outback

129. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : Social exclusion can negatively impact the health and well-being of individuals and groups.
Reason (R) : Exclusion from economic opportunities, education, and healthcare services leads to poverty, stress, and poor health outcomes.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct

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(A) Cultural Heritage - Future technological innovations
(B) Cultural Ecology - Study of human-environment relationship
(C) Social Exclusion - Denial of access to resources
(D) Cultural Convergence - Merging of cultures

59. What is the most significant reason for the rise of 'Medical Tourism in India'?
(A) The presence of unique tropical diseases not found elsewhere.
(B) Government regulations that prohibit Indian citizens from using certain hospitals.
(C) The scenic beauty of hospital locations.
(D) The combination of high-quality medical care at a comparatively lower cost.

60. The competition between nations for influence and control over the Arctic region, driven by melting ice and access to new shipping routes and resources, is a prime example of:
(A) Social Well-being
(B) Geopolitics of Climate Change
(C) Health Care Planning in India
(D) Cultural Convergence

61. Consider the following statements regarding the determinants of electoral behavior in India:
1. Voters are influenced by primordial loyalties like caste and religion.
2. The performance of the incumbent government and its development work can be a factor.
3. Leadership charisma and party affiliation play a significant role.
4. Economic issues such as inflation and unemployment often sway voter decisions.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2, 3 and 4
(D) 2 and 4 only

62. What does 'Quality of Life' encompass that 'standard of living' (based on income) might not?
(A) Only the per capita GDP and gross domestic product of a nation.
(B) Subjective factors like personal freedom, security, and environmental quality.
(C) The total number of factories and industrial zones in a given region.
(D) The total monetary value of a country's various international exports.

63. Which of the following is a key focus of India's Health Care Policies?
(A) To actively discourage international medical tourism.
(B) To privatize all existing public health institutions.
(C) To achieve universal health coverage and improve public health infrastructure.
(D) To focus exclusively on urban healthcare while neglecting rural areas.

64. Consider the following statements and select the correct option.
Statement I : The spatial distribution of tribal populations in India is highly concentrated in the urban metropolises.
Statement II : Central India is a major region with a significant concentration of tribal groups.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

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65. Match List I with List II regarding the concept and its example/focus and select the correct option using the codes given below.
List I: (Concept)
P. Social Exclusion
Q. Cultural Ecology
R. Geopolitics of Climate Change
S. Medical Tourism
List II: (Example/Focus)
1. Conflicts over water resources due to melting glaciers
2. A foreign national traveling to India for surgery
3. A community being denied access to public services based on their caste
4. The study of pastoral nomadism in arid environments

Codes:
(A) P-3, Q-4, R-1, S-2
(B) P-4, Q-3, R-2, S-1
(C) P-1, Q-2, R-3, S-4
(D) P-3, Q-1, R-4, S-2

(C) Political Geography
(D) Cultural Ecology

85. Consider the following statements and select the correct option.
Statement I : The European Union (EU) is an example of a regional organization focused on economic and political cooperation.
Statement II : The primary goal of the EU is to manage global oil prices.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

86. Match List I with List II and select the correct option using the codes given below.
List I: (Geographical Concept)
P. Cultural Ecology
Q. Social Exclusion
R. Rimland Theory
S. Medical Tourism
List II: (Scholar / Key Idea)
1. Nicholas J. Spykman
2. Travel for healthcare
3. Julian Steward
4. Marginalization of groups
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-4, R-1, S-2
(C) P-2, Q-1, R-4, S-3
(D) P-4, Q-3, R-2, S-1

87. Which of the following best defines 'Disease Ecology'?
(A) The study of the political implications of pandemics within a global framework.
(B) The study of how diseases are classified based on their specific physical symptoms.
(C) The study of the spatial distribution of healthcare facilities in a region.
(D) The study of the relationship between disease patterns and environmental factors.

88. The presence of distinct 'Dravidian' and 'Indo-Aryan' language families in India is a key component of the study of:
(A) Geopolitics of the Indian Ocean
(B) Spatial distribution of social groups
(C) Electoral reforms
(D) Health care policies

89. A state's attempt to secure access to rare earth minerals located in other countries, due to their importance for modern technology, is a central issue in:
(A) Cultural heritage
(B) Social well-being
(C) Neopolitics of world natural resources
(D) Disease ecology

90. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : Cultural convergence is accelerating in the contemporary world.
Reason (R) : Globalization, through advanced communication and transportation technologies, facilitates the rapid spread of cultural traits across borders.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

91. Which of the following is NOT an example of a regional organization of cooperation?
(A) SAARC
(B) NATO
(C) ASEAN
(D) EU

92. The Gaddi, Santhal, and Gond are examples of what type of social group, whose spatial distribution is a key topic of study in Indian geography?
(A) Language
(B) Caste
(C) Religion
(D) Tribe

93. The idea that "Who rules East Europe commands the Heartland; Who rules the Heartland commands the World-Island; Who rules the World-Island commands the World" is the central thesis of:
(A) The Rimland Theory
(B) The Heartland Theory
(C) The theory of Cultural Convergence
(D) The concept of Social Well-being

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76. Consider the following statements and select the correct option.

Statement I : Social well-being is a unidimensional concept measured solely by income.

Statement II : Quality of life is a broader, multidimensional concept that includes social well-being, physical health, and personal freedom.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

77. Arrange the following regional organizations based on their approximate geographical focus, from West to East.

1. EU (European Union)
2. SAARC (South Asian Association for Regional Cooperation)
3. ASEAN (Association of Southeast Asian Nations)
4. OPEC (Organization of the Petroleum Exporting Countries - major members in Middle East)

Which of the following is the correct order?

(A) 1, 4, 2, 3
(B) 4, 1, 2, 3
(C) 1, 2, 3, 4
(D) 2, 3, 4, 1

78. Which of the following is the most accurate definition of a 'Cultural Complex'?

(A) A single, isolated cultural habit or singular tool used by individuals.
(B) A discrete combination of functionally interrelated cultural traits, such as those associated with a particular sport or religion.
(C) A monolithic global culture that remains identical across every geographic territory.
(D) A temporary geographical area where many different and unrelated cultures happen to meet.

79. The study of how physical barriers like mountains or deserts have shaped the territories of states relates to the concept of:

(A) Social Well-being
(B) Medical Tourism
(C) Boundaries and Frontiers
(D) Nutritional Status

80. A government policy that provides subsidized food grains to populations in drought-prone regions during specific months of the year is directly addressing:

(A) The seasonal distributional pattern of nutritional status.
(B) The geopolitics of climate change.
(C) The determinants of electoral behaviour.
(D) The Heartland theory.

81. Which of the following statements would be of LEAST interest to a political geographer studying trends and developments?

(A) The impact of the internet on national identity and sovereignty.
(B) The rise of transnational environmental movements.
(C) The chemical composition of basaltic rocks.
(D) The geographical aspects of international terrorism.

82. Consider the following topics:

1. Social Structure and Processes
2. Social Well-being and Quality of Life
3. Spatial distribution of Tribe, Caste, Religion and Language in India
4. Determinants of Electoral Behaviour
5. Geo-politics of India Ocean

Which of the above topics are studied under 'Cultural and Social Geography'?

(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 3, 4 and 5
(D) 1 and 2 only

83. The study of the "geography of federalism" would analyze which of the following in the Indian context?

(A) The creation of states like Jharkhand and Telangana.
(B) The dietary habits of people in coastal regions.
(C) The architectural style of Mughal monuments.
(D) The spread of a viral disease.

84. The Durand Line, which marks the boundary between Pakistan and Afghanistan, is a classic example of a subject studied in:

(A) Social Geography
(B) Medical Geography

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and cultural development in the South Asian region.
(C) Form a military alliance against external threats.
(D) Create a single currency for all of Asia.

104. Consider the following themes:
1. Heartland and Rimland Theories
2. Geography of Federalism
3. Geopolitics of Climate Change
4. Social Well-being and Quality of Life
5. Diseases Ecology

Which of the above are key themes within the study of Political Geography?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 3, 4 and 5
(D) 1 and 4 only

105. Match List I with List II regarding the term and its description and select the correct option using the codes given below.
List I: (Term)
P. Cultural Trait
Q. Cultural Complex
R. Cultural Region
S. Cultural Realm
List II: (Description)
1. The smallest unit of learned behavior, a single element of culture.
2. A large segment of the Earth's surface having fundamental uniformity in its cultural characteristics.
3. A set of functionally interrelated cultural traits.
4. An area within which a particular cultural system prevails.

Codes:
(A) P-1, Q-3, R-4, S-2
(B) P-2, Q-4, R-1, S-3
(C) P-3, Q-1, R-2, S-4
(D) P-4, Q-2, R-3, S-1

106. The study of voting patterns, their spatial variations, and the factors influencing them is the core of:
(A) Cultural Ecology
(B) Electoral Geography
(C) Disease Ecology
(D) Medical Tourism

107. Which statement accurately reflects the 'Neopolitics of World Natural Resources'?
(A) It suggests that natural resources are no longer important in international relations.
(B) It focuses on the renewed and evolving geopolitical struggles over the access and control of essential resources like water, energy, and minerals.
(C) It is a purely historical study focused on resource trade during the colonial era.
(D) It deals exclusively with the cultural symbolism associated with local natural objects.

108. The concept of 'Social Well-being' goes beyond economic prosperity to include:
(A) The total number of international boundaries a sovereign country has.
(B) The gross tonnage of goods shipped through national ports each year.
(C) Factors like health, education, social security, and personal safety.
(D) The physical size and firepower of a country's various military branches.

109. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : India's federal structure has a geographical dimension.
Reason (R) : The division of powers and the very creation of states in India have often been based on spatial-cultural and linguistic differences, leading to a distinct political-geographical map.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

110. Which of the following is NOT a direct concern of Health Care Planning and Policies in India?
(A) The location and accessibility of Primary Health Centres (PHCs).
(B) The implementation of national immunization programs.
(C) The determination of international maritime boundaries.
(D) The regulation of drug prices and availability.

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94. Which of the following questions would be most relevant to a study on the 'Determinants of Electoral Behaviour'?
(A) What is the geological history of the polling station's location?
(B) How does a voter's caste and economic status influence their choice of candidate?
(C) What is the nutritional value of the mid-day meal served in local schools?
(D) How has the sea level changed in the Indian Ocean over the last century?

95. Consider the following statements regarding 'Political Geography':
1. It is concerned with the study of the spatial inequality of political processes.
2. It analyzes how political phenomena are influenced by their geographical location.
3. It includes the study of boundaries, federalism, and geopolitics.
4. It is an outdated field with no relevance in the modern world.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 4 only

96. A case study on how a community's religious beliefs and dietary restrictions impact their overall nutritional health falls under the intersection of:
(A) Social Geography and Medical Geography
(B) Political Geography and Geomorphology
(C) Geopolitics and Climatology
(D) Electoral Behaviour and Cultural Heritage

97. The process by which social relations and interactions are established and maintained over time is known as:
(A) Social Exclusion
(B) Social Process
(C) Cultural Region
(D) Medical Tourism

98. Consider the following statements and select the correct option.
Statement I : The geopolitics of climate change includes the study of potential conflicts over resources like water, which may become scarcer.
Statement II : The impacts of climate change, such as sea-level rise, are expected to be uniform across all geographical locations.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

99. In political geography, a 'frontier' is conceptually different from a 'boundary' in that a frontier is a:
(A) Legally defined line
(B) Zone or area of transition
(C) Man-made wall
(D) Demilitarized line agreed upon by treaty

100. Arrange the following in a logical sequence from cause to effect.
1. Formulation of Health Care Policies
2. Identification of a major public health problem (e.g., high infant mortality)
3. Improvement in Social Well-being indicators
4. Implementation of health programs (e.g., immunization drives)

Which of the following is the correct order?
(A) 1, 2, 4, 3
(B) 2, 1, 4, 3
(C) 4, 3, 1, 2
(D) 2, 4, 1, 3

101. The concept that culture is a system of adaptation to a particular environmental setting is central to:
(A) Cultural Convergence
(B) Cultural Ecology
(C) Cultural Heritage
(D) Social Exclusion

102. Which of the following would be the best example of a study in 'Disease Ecology' in India?
(A) A study of the impact of monsoon patterns on the spread of malaria in Odisha.
(B) A study of electoral reforms introduced in the 1990s.
(C) A study of the strategic importance of the Andaman and Nicobar Islands.
(D) A study of the architecture of South Indian temples.

103. The primary purpose of SAARC (South Asian Association for Regional Cooperation) is to:
(A) Regulate global oil production.
(B) Promote economic growth, social progress,

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been a continuous process.

Reason (R) : Issues like voter intimidation, use of money power, and inaccuracies in voter lists necessitate ongoing changes to ensure fair elections.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

50. Which statement about the 'Geopolitics of the Indian Ocean' is incorrect?
(A) The region is devoid of natural resources, making it strategically unimportant.
(B) It involves the strategic interests of littoral states and major global powers.
(C) Key maritime chokepoints like the Strait of Malacca are of great significance.
(D) It includes concerns over piracy, maritime security, and control over sea lanes.

51. The seasonal pattern of diseases like influenza (more common in winter) or dengue (more common during the monsoon) in India is a central topic in:
(A) Cultural Heritage studies
(B) The Geography of Federalism
(C) The study of Disease Ecology
(D) The Rimland Theory

52. The establishment of the European Union (EU), where member states have pooled some of their sovereignty for common economic and political goals, is a major subject within:
(A) Disease Ecology
(B) The spatial distribution of tribes in India
(C) Nutritional Status classification
(D) Trends and Developments in Political Geography

53. Consider the following components related to the study of medical geography in India:
1. Etiological conditions of nutritional status
2. Health Care Planning and Policies
3. Medical Tourism
4. Heartland and Rimland Theories
5. Electoral Reforms

Which of the above are directly related to the study of Medical Geography with special reference to India?
(A) 4 and 5 only
(B) 1, 2, 3, 4 and 5
(C) 1, 2 and 3 only
(D) 1 and 4 only

54. 'SAARC' and 'ASEAN' are examples of:
(A) Cultural Complexes
(B) Regional Organisations of Cooperation
(C) Social Structures
(D) Types of Electoral Behaviour

55. Arrange the following levels of cultural entities from the smallest/simplest to the largest/most complex.
1. Cultural Region
2. Cultural Complex
3. Cultural Trait
4. Cultural Realm

Which of the following is the correct order?
(A) 3, 2, 1, 4
(B) 2, 3, 1, 4
(C) 4, 1, 2, 3
(D) 1, 4, 3, 2

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56. Consider the following statements and select the correct option.

Statement I : A frontier is a politically defined line of separation, whereas a boundary is a zone of transition.

Statement II : In modern political geography, most frontiers have been replaced by precisely demarcated boundaries.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

57. The 'Neopolitics of World Natural Resources' is concerned with:
(A) The geological formation of mineral deposits.
(B) The historical use of resources by ancient civilizations.
(C) The contemporary political dynamics and conflicts related to the control and distribution of natural resources.
(D) The cultural significance and religious symbolism of specific natural landmarks.

58. Identify the incorrect pair.

111. The concentration of certain diseases in particular geographical areas (e.g., Goitre in Himalayan foothills due to iodine deficiency in soil) is a classic example of the link between:
(A) Environment and Human Health
(B) Electoral Reforms
(C) Cultural Convergence
(D) Geopolitics of the Indian Ocean

112. The historical monuments, traditional arts, and folklore of a community collectively constitute its:
(A) Social Structure
(B) Cultural Heritage
(C) Disease Ecology
(D) Electoral Behaviour

113. Consider the following statements regarding the 'Geopolitics of Climate Change':
1. It involves studying how the physical impacts of climate change can alter geopolitical relationships.
2. It considers the potential for conflict over resources like water and arable land.
3. It examines the international negotiations and power dynamics related to climate treaties.
4. It is solely concerned with the history of past climate fluctuations.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

114. The framework of relationships and institutions within a society, such as family, caste, and class, is referred to as:
(A) Social Structure
(B) Cultural Area
(C) Geopolitics
(D) Medical Tourism

115. The 'Rimland' as conceptualized by Nicholas J. Spykman, is characterized by its:
(A) Isolation and inaccessibility.
(B) Arid climate and sparse population.
(C) Amphibian character, having access to both land and sea power.
(D) Lack of strategic resources.

116. Consider the following statements and select the correct option.
Statement I : The spatial distribution of religious groups in India is homogenous, with every religion being equally represented in all states.
Statement II : Certain states and regions in India show a high concentration of specific religious communities.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

117. An Indian health policy aimed at combating iron-deficiency anemia among adolescent girls is directly addressing a problem related to:
(A) Geopolitics of the Indian Ocean
(B) Nutritional Status
(C) Electoral Reforms
(D) Heartland Theory

118. Which of the following represents an incorrect pair?
(A) SAARC - South Asian Cooperation
(B) EU - North American Union
(C) ASEAN - Southeast Asian Nations
(D) OPEC - Oil and Petroleum Exporting Countries

119. A situation where a particular ethnic group is systematically denied housing in certain neighborhoods of a city is a manifestation of:
(A) Social Exclusion
(B) Cultural Ecology
(C) Medical Tourism
(D) Geopolitics of Climate Change

120. The strategic importance of the Strait of Hormuz for global oil trade is a key topic within:
(A) Disease Ecology
(B) Geopolitics of the Indian Ocean and World Resources
(C) The spatial distribution of castes in India
(D) Cultural Heritage

121. Consider the following statements regarding social groups in India:
1. The spatial distribution of caste groups can influence settlement patterns in rural India.
2. Language has been a significant basis for

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66. The study of how federal systems like India, the USA, or Canada manage regional identities and demands for autonomy falls under:
(A) Disease Ecology
(B) Geography of Federalism
(C) Cultural Heritage
(D) Rimland Theory

67. Which of the following is an example of a 'Social Process'?
(A) The rock cycle
(B) The process of urbanization and social mobility
(C) The orbit of the Earth around the Sun
(D) The chemical process of photosynthesis

68. The core argument of the Heartland theory is that the state which controls the 'Pivot Area' or Heartland is likely to:
(A) Command the world's oceans.
(B) Achieve world dominance.
(C) Suffer from extreme social exclusion.
(D) Have the best healthcare policies.

69. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The concept of 'Cultural Region' is fundamental to cultural geography.
Reason (R) : It allows for the spatial analysis of cultural traits and complexes, helping to understand the distribution and organization of cultures.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

70. All of the following are part of the study of 'Political Geography' EXCEPT:
(A) Boundaries and Frontiers
(B) Nutritional Status and its classification
(C) Geography of Federalism
(D) Geopolitics of World Resources

71. A classification of nutritional status that includes conditions like Kwashiorkor and Marasmus would be based on:
(A) Electoral behavior
(B) Geopolitical theories
(C) Etiological conditions (protein-energy malnutrition)
(D) Regional organisations of cooperation

72. The rise of English as a global language for business and science, adopted by many different cultures, is a manifestation of:
(A) Social Exclusion
(B) Cultural Convergence
(C) Disease Ecology
(D) Geography of Federalism

73. Consider the following statements regarding the "Geopolitics of World Resources":
1. Resources are evenly distributed across the globe.
2. The location of strategic resources influences state power and foreign policy.
3. Competition for control over resources can be a source of international conflict.
4. The political and economic stability of a region is often linked to its resource wealth.

Which of the above statements are correct?
(A) 1 and 2 only
(B) 2, 3 and 4 only
(C) 1, 3 and 4 only
(D) 1 and 4 only

74. The concept of 'Environment and Human Health' in geography is best understood as:
(A) A study focused primarily on the specific genetic and biological causes of hereditary disease.
(B) An examination of the relationship between environmental factors (physical, biological, social) and health outcomes.
(C) A purely political debate regarding the allocation of national healthcare funding.
(D) A detailed historical account of medical practices used by various ancient civilizations.

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75. The division of India into states based largely on linguistic lines is a practical manifestation of which geographical concepts?
(A) Spatial distribution of language groups and geography of federalism
(B) Heartland and Rimland theories
(C) Disease ecology and nutritional status
(D) Medical tourism and cultural convergence

explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

130. All of the following are potential consequences studied under the 'Geopolitics of Climate Change' EXCEPT:
(A) Conflicts over diminishing water resources.
(B) Mass migrations of 'climate refugees'.
(C) The political stability of the Roman Empire.
(D) Disputes over newly accessible Arctic sea routes.

131. The term 'etiological conditions' in health geography refers to the:
(A) Study of the specific causes and origins of a disease.
(B) Detailed geographical distribution of regional hospitals.
(C) Various seasonal patterns of health and wellness.
(D) Total monetary cost of specific medical treatments.

132. The linguistic reorganization of Indian states in 1956 is a prime example of the application of which geographical concept?
(A) The spatial distribution of language groups influencing political boundaries.
(B) The principles of cultural ecology.
(C) The strategic implications of the Rimland theory.
(D) The growth of medical tourism.

133. Consider the following topics:
1. Boundaries and Frontiers (with special reference to India)
2. Electoral Reforms in India
3. Determinants of Electoral Behaviour
4. Nutritional Status
5. Social Well-being

Which of the above topics are central to 'Political Geography'?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 3, 4 and 5
(D) 1 and 5 only

134. The process of interaction, competition, and assimilation among different social groups within a society is termed:
(A) Social Structure
(B) Social Well-being
(C) Social Exclusion
(D) Social Processes

135. Nicholas Spykman, the proponent of the Rimland Theory, famously stated:
(A) "Who controls the Rimland rules Eurasia; who rules Eurasia controls the destinies of the world"
(B) "Who rules East Europe commands the Heartland"
(C) "Culture is the superorganic"
(D) "The state is a living organism"

136. Consider the following statements and select the correct option.
Statement I : India's health care policies are designed to be static and unchanging.
Statement II : Health policies in India are periodically reviewed and updated to address new challenges and changing health priorities, such as the rise of non-communicable diseases.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

137. Arrange the following events/concepts in a logical chronological sequence.
1. Proposition of Heartland Theory
2. Formation of the European Union
3. Emergence of 'Geopolitics of Climate Change' as a major theme
4. Proposition of Rimland Theory

Which of the following is the correct order?
(A) 1, 4, 2, 3
(B) 4, 1, 2, 3
(C) 1, 2, 4, 3
(D) 2, 1, 3, 4

138. Which of the following is NOT considered a part of a person's 'Quality of Life'?
(A) Level of personal happiness
(B) Access to clean air and water
(C) The political ideology of a neighbouring country
(D) Sense of security in their community

139. The study of the spatial clustering of the Jain community in states like Gujarat, Rajasthan,

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(A) The administrative process of counting votes after a local election.
(B) The professional conduct of political candidates during their campaigns.
(C) The manner in which people vote and the factors influencing their voting decisions.
(D) The formal legal framework governing the operation of national elections.

196. Consider the following statements and select the correct option.
Statement I : The concept of cultural heritage is limited only to tangible things like buildings and monuments.
Statement II : Cultural heritage also includes intangible elements like traditions, performing arts, and oral histories.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

197. The study of the spatial distribution of the Gond and Bhil tribes in Central India falls under which topic?
(A) Geopolitics of World Resources
(B) Spatial distribution of social groups in India
(C) Electoral Reforms in India
(D) Health Care Policies in India

198. The primary focus of the regional organization OPEC is:
(A) Cultural exchange
(B) Military cooperation
(C) Coordination of petroleum policies
(D) Political integration

199. When geographers study the relationship between the physical environment of the Himalayas and the unique cultural adaptations of the people living there, they are engaging in:
(A) Cultural Ecology
(B) Geopolitics
(C) Social Exclusion studies
(D) Electoral analysis

200. A patient from the USA travelling to India for a knee replacement surgery at a lower cost is an example of:
(A) Social Exclusion
(B) Cultural Heritage
(C) Medical Tourism
(D) A Social Process

201. Consider the following topics:
1. Concept of Culture, Cultural Complexes, Areas and Region
2. Social Well-being and Quality of Life
3. Spatial distribution of Tribe, Caste, Religion and Language in India
4. Diseases Ecology and Nutritional Status
5. Heartland and Rimland Theories

Which of the above elements are considered part of the "Social and Cultural Geography" section?
(A) 1 and 2 only
(B) 5 only
(C) 1, 2, 3 and 4 only
(D) 1, 2, 3, 4 and 5

202. The concept of a 'cultural hearth' (an area where cultural traits develop and from which they diffuse) is most closely related to which topic?
(A) Concept of Culture, Areas and Region
(B) Geopolitics of Climate Change
(C) Electoral Reforms in India
(D) Social Exclusion

203. The competition between China and India for influence in countries around the Indian Ocean is a modern manifestation of:
(A) Disease Ecology
(B) Geo-politics of India Ocean
(C) Cultural Convergence
(D) Social Well-being

204. Consider the following statements and select the correct option.
Statement I : Federalism involves a single, all-powerful central government with no division of power.
Statement II : The Geography of Federalism studies the spatial aspects of the division of power between national and sub-national units of government.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

205. Match List I with List II and select the correct option using the codes given below.
List I: (Theorist)

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shared interests.

148. The study of how the discovery of offshore oil reserves in the South China Sea has led to competing territorial claims by several nations is an example of:
(A) Neopolitics of World Natural Resources
(B) Cultural Heritage preservation
(C) Social Well-being measurement
(D) Disease Ecology of India

149. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The determinants of electoral behaviour in India are complex and multi-faceted.
Reason (R) : Voters in India are influenced by a single factor, which is the candidate's personal wealth.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

150. Which of the following is NOT a major language family with a significant spatial presence in India?
(A) Indo-Aryan
(B) Dravidian
(C) Sino-Tibetan
(D) Uralic

151. A key trend in modern political geography is the:
(A) Decreasing importance of international borders.
(B) Study of geography's role in a globalizing world, including the rise of supranationalism and localism.
(C) Belief that geography has no influence on politics.
(D) Exclusive focus on 19th-century colonial expansion.

152. The development of specific housing types (e.g., stilt houses in flood-prone areas) in response to environmental conditions is a subject of:
(A) Cultural Ecology
(B) Social Exclusion
(C) Geopolitics of the Indian Ocean
(D) Electoral Reforms

153. Consider the following statements regarding the study of 'Social Structure and Processes':
1. It examines the enduring patterns of social relations.
2. It analyzes dynamic activities like cooperation, competition, and conflict.
3. It is concerned with how society is organized and how it changes.
4. It is limited to the study of political boundaries.

Which of the above statements are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 4 only

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154. The 'National Health Mission' in India is a major policy initiative related to:
(A) Health Care Planning and Policies
(B) Geopolitics of Climate Change
(C) Heartland and Rimland Theories
(D) Cultural Heritage

155. The concept that posits that the Eurasian coastal lands are the key to global power is known as:
(A) Heartland Theory
(B) Rimland Theory
(C) Geopolitics of Climate Change
(D) Geography of Federalism

156. Consider the following statements and select the correct option.
Statement I : Medical tourism in India benefits from a large pool of well-trained doctors and modern medical facilities.
Statement II : The cost of medical procedures in India is significantly higher than in most Western countries, which is its main attraction.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

157. The study of the strategic chokepoints, naval bases, and trade routes in the Indian Ocean falls under:
(A) Geo-politics of India Ocean
(B) Social well-being

(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

177. Arrange the following geopolitical entities/ concepts in order of their scale, from largest to smallest.
1. A State's electoral constituency
2. The Heartland
3. The World-Island (Eurasia-Africa)
4. A federal state's province

Which of the following is the correct order?
(A) 3, 2, 4, 1
(B) 1, 4, 2, 3
(C) 2, 3, 1, 4
(D) 3, 4, 2, 1

178. Which of the following is a key aspect of the 'Geo-politics of India Ocean'?
(A) The nutritional status of coastal populations.
(B) The control over strategic sea lanes and chokepoints.
(C) The caste structure of fishing communities.
(D) The architectural style of lighthouses.

179. A government initiative to provide better housing, sanitation, and employment opportunities to a marginalized community is an attempt to improve their:
(A) Geopolitical standing
(B) Social Well-being and Quality of Life
(C) Cultural Heritage status
(D) Electoral campaign strategy

180. The fact that many multinational corporations set up offices in the same few global cities is an example of a:
(A) Social Process (agglomeration)
(B) Cultural Trait
(C) Disease Ecology pattern
(D) Federal system

181. Consider the following statements regarding the 'Geography of Federalism':
1. It is concerned with how federal systems manage territorial diversity.
2. It analyzes conflicts and cooperation between different levels of government.
3. The creation of new states or provinces is a key area of study.
4. It is only applicable to unitary states.
5. It ignores economic and cultural factors in politics.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 4 and 5 only
(D) 1 and 3 only

182. 'Nutritional status' as a subject in geography is concerned with:
(A) The politics of food aid.
(B) The health condition of an individual or a population as influenced by the intake and utilization of nutrients.
(C) The cultural preference for certain tastes.
(D) The history of agricultural development.

183. The study of the conflict in the Middle East, often linked to the control of oil reserves, falls squarely within the domain of:
(A) Social Well-being
(B) Neopolitics of World Natural Resources
(C) Cultural Ecology
(D) Medical Tourism in India

184. Consider the following statements and select the correct option.
Statement I : The member countries of SAARC are primarily located in Southeast Asia.
Statement II : The member countries of ASEAN are primarily located in South Asia.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

185. Match List I with List II regarding Indian states/ regions and dominant language families and select the correct option using the codes given below.
List I: (State/Region)
P. Tamil Nadu
Q. Uttar Pradesh
R. Nagaland
S. West Bengal
List II: (Dominant Language Family)
1. Indo-Aryan
2. Sino-Tibetan
3. Dravidian
4. Indo-Aryan
Codes:

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regionalism.
(B) The Heartland Theory's application to India.
(C) The impact of climate change on the Indian Ocean.
(D) The patterns of medical tourism.

167. Which of the following best exemplifies 'Cultural Heritage'?
(A) A newly developed software program.
(B) The traditional folk music and dance forms of Rajasthan.
(C) A recently constructed highway.
(D) A forecast of next year's crop production.

168. The idea of a 'clash of civilizations' can be seen as a macro-level theme within which broad sub-field?
(A) Medical Geography
(B) Trends and Developments in Political Geography
(C) Disease Ecology
(D) Health Care Planning

169. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The European Union (EU) is a powerful regional organization of cooperation.
Reason (R) : The EU has created a single market, a common currency for many members, and coordinates political and security policies.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

170. All of the following are components of the study of nutritional status in India EXCEPT:
(A) Classification of nutritional deficiencies.
(B) The role of India in SAARC.
(C) Spatial patterns of malnutrition.
(D) Seasonal variations in food availability and its impact on health.

171. In India, the high concentration of the speakers of the Austro-Asiatic language family (e.g., Santhali, Mundari) is found predominantly in:
(A) The southern states of Kerala and Tamil Nadu.
(B) The northern plains of Punjab and Haryana.
(C) The eastern and central tribal belts.
(D) The western desert region of Rajasthan.

172. The study of how a country's geographical position, resources, and spatial relationships influence its foreign policy is known as:
(A) Geopolitics
(B) Social well-being
(C) Cultural ecology
(D) Medical geography

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173. Consider the following topics:
1. Analysis of seasonal patterns of disease.
2. Health care planning and policy implementation.
3. Study of nutritional status.
4. Determinants of electoral behaviour.

Which of the above are related to 'Medical Geography' in the Indian context?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 4 only
(D) 1, 2, 3 and 4

174. The primary difference between a boundary and a frontier is that a boundary is a 'line', while a frontier is a:
(A) Point
(B) Treaty
(C) Zone
(D) Law

175. The implementation of the Model Code of Conduct before elections in India is an example of an:
(A) Electoral Reform
(B) Geopolitical strategy
(C) Cultural tradition
(D) Health policy

176. Consider the following statements and select the correct option.
Statement I : The concept of cultural ecology proposes that cultures are shaped solely by human imagination, independent of the environment.
Statement II : The study of cultural ecology examines the relationship between a culture group and its natural environment.
(A) Both Statement I and Statement II are true.

(C) Disease ecology
(D) Cultural heritage

158. Which of the following is an incorrect pair?
(A) Tribe - Santhal
(B) Language Family - Dravidian
(C) Religion - Islam
(D) Caste - European

159. Improving sanitation, providing safe drinking water, and controlling vector populations (like mosquitoes) are public health interventions derived from the principles of:
(A) Disease Ecology
(B) Electoral Geography
(C) Geopolitics
(D) Cultural Convergence

160. An analysis of the relationship between the central government and state governments in India regarding the sharing of financial resources is a core issue in:
(A) Geography of Federalism
(B) Cultural Ecology
(C) Medical Tourism
(D) Rimland Theory

161. Consider the following statements regarding the concept of 'Cultural Convergence':
1. It is a process where different cultures become more similar.
2. It is often driven by globalization, trade, and media.
3. It can lead to the loss of unique cultural traits.
4. It implies that cultures are completely isolated and never interact.
5. It is the same as cultural ecology.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 2, 4 and 5 only
(D) 1 and 2 only

162. The main argument of Mackinder's Heartland Theory was that:
(A) Sea power was the ultimate key to world domination.
(B) The control of the "Pivot Area" in Eurasia could lead to world power.
(C) The world's climate was changing due to industrialization.
(D) Federalism was the most stable form of government.

163. The existence of separate colonies or 'tolas' for different caste groups in many Indian villages is a spatial manifestation of:
(A) Social Structure
(B) Cultural Convergence
(C) Medical Tourism
(D) The Rimland Theory

164. Consider the following statements and select the correct option.
Statement I : The Geopolitics of World Resources analyzes how the uneven distribution of resources like oil and water affects international relations.
Statement II : All essential natural resources are evenly distributed across the surface of the Earth.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

165. Match List I with List II regarding Indian states/ regions and dominant language families and select the correct option using the codes given below.
List I: (State/Region)
P. Tamil Nadu
Q. Uttar Pradesh
R. Nagaland
S. West Bengal
List II: (Dominant Language Family)
1. Indo-Aryan
2. Sino-Tibetan
3. Dravidian
4. Indo-Aryan
Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

166. A political geographer studying the reasons for the creation of new states in India, such as Uttarakhand or Chhattisgarh, would be focusing on:
(A) The Geography of Federalism and

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(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

186. The increasing popularity of yoga and Indian cuisine across the world is an example of:
(A) Social Exclusion
(B) Cultural Diffusion, a process related to Cultural Convergence
(C) The Heartland Theory
(D) Electoral Reforms

187. The political geographer Halford Mackinder wrote about the Heartland in the early 20th century, primarily concerned about the strategic implications of:
(A) Land power, particularly railways, making the Eurasian core accessible.
(B) The rise of air power.
(C) The discovery of Antarctica.
(D) Climate change.

188. Which of the following is the best example of 'social structure' influencing spatial patterns?
(A) The random distribution of trees in a forest.
(B) The segregation of residential areas based on caste or income in a city.
(C) The flow of a river through a plain.
(D) The seasonal migration of birds.

189. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The India-Bangladesh border is characterized by complex issues, including enclaves and illegal migration.
Reason (R) : The boundary was demarcated hastily during the partition of India and cuts across a culturally and physically homogenous landscape.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

190. Which of the following is NOT a focus of Health Care Planning in India?
(A) Increasing the number of doctors and nurses.
(B) Building new hospitals and primary health centers.
(C) Ensuring the supply of essential medicines.
(D) Formulating the country's foreign policy.

191. The term 'Geopolitics of Climate Change' refers to the study of:
(A) The deep geological history and ancient climate shifts of the Earth.
(B) How political power and international relations are being shaped by the consequences of a changing climate.
(C) The diverse cultural perceptions and local mythologies related to the weather.
(D) The scientific development of new climate-resistant agricultural crops.

192. A low score on the Human Development Index (HDI) for a region would likely indicate a low level of:
(A) Social Well-being and Quality of Life
(B) Cultural Convergence
(C) Geopolitical importance
(D) Medical Tourism

193. Consider the following topics:
1. A focus on the geography of power at multiple scales, from local to global.
2. The study of feminist and post-colonial perspectives in geopolitics.
3. An analysis of the political implications of the internet and cyberspace.
4. The idea that geography has become irrelevant in the modern world.

Which of the above topics relate to the 'Trends and Developments in Political Geography'?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 4 only
(D) 1 and 3 only

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194. The study of how different religious groups in India have unique dietary laws that affect their nutritional intake is an intersection of:
(A) Social Geography and Medical Geography
(B) Political Geography and Geomorphology
(C) Economic Geography and Geomorphology
(D) Geopolitics and Oceanography

195. What does the term 'electoral behaviour' refer to?

and Maharashtra falls under the geographical analysis of:
(A) Religion as a social group
(B) Geopolitics of the Indian Ocean
(C) Medical tourism trends
(D) Electoral reforms

140. Which of the following would a political geographer studying the 'Geography of Federalism' in India be most interested in?
(A) The impact of inter-state river water disputes on centre-state relations.
(B) The classification of nutritional diseases.
(C) The cultural practices of a specific tribe.
(D) The architectural details of the Parliament building.

141. Consider the following scenarios:
1. The global competition for control over lithium deposits, essential for batteries.
2. The strategic importance of the Suez Canal for oil transportation.
3. The influence of OPEC on global energy prices.
4. The impact of a country's agricultural self-sufficiency on its foreign policy.
5. The study of a single village's crop rotation patterns.

Which of the above are valid examples related to the "Geopolitics of World Resources"?
(A) 1, 2, 3 and 4 only
(B) 5 only
(C) 1 and 2 only
(D) 1, 2, 3, 4 and 5

142. The term 'Cultural Region' in geography refers to:
(A) A museum displaying various historical cultural artifacts.
(B) A geographical unit based on characteristics and functions of culture.
(C) A political alliance established between shared cultures.
(D) The process of one culture adopting traits from another.

143. OPEC (Organization of the Petroleum Exporting Countries) is a key organization in the study of:
(A) Cultural Convergence
(B) Social Well-being
(C) Geopolitics of World Resources
(D) Health Care Planning in India

144. Consider the following statements and select the correct option.
Statement I : A boundary is a zone of transition, while a frontier is a precise line.
Statement II : With reference to India, its international borders with Pakistan and China are examples of boundaries.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

145. Match List I with List II regarding Indian states/regions and dominant language families and select the correct option using the codes given below.
List I: (State/Region)
P. Tamil Nadu
Q. Uttar Pradesh
R. Nagaland
S. West Bengal
List II: (Dominant Language Family)
1. Indo-Aryan
2. Sino-Tibetan
3. Dravidian
4. Indo-Aryan
Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

146. A geographer mapping the prevalence of goiter in the sub-Himalayan region and linking it to iodine-deficient soils is studying:
(A) Geopolitics of Climate Change
(B) Environment and Human Health
(C) Electoral Reforms
(D) Cultural Convergence

147. Which of the following scenarios best illustrates the concept of 'Social Exclusion'?
(A) A person choosing to live in a remote area for peace and quiet.
(B) A tourist visiting India for a medical procedure.
(C) A community being denied access to clean drinking water because of their caste.
(D) A group of friends forming a club with

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P. Halford J. Mackinder
Q. Nicholas J. Spykman
R. Friedrich Ratzel
S. Julian Steward

List II: (Theory/Concept)
1. Cultural Ecology
2. Organic State Theory (Lebensraum)
3. Rimland Theory
4. Heartland Theory

Codes:
(A) P-4, Q-3, R-2, S-1
(B) P-3, Q-4, R-1, S-2
(C) P-4, Q-3, R-1, S-2
(D) P-1, Q-2, R-3, S-4

206. Which of the following is the best definition of a 'social process'?
(A) The physical and chemical weathering of sedimentary rocks.
(B) The repetitive and dynamic forms of interaction in social life, such as competition or cooperation.
(C) A static geographical map displaying various social groups.
(D) The complex chemical composition of the Earth's atmosphere.

207. A government program to fortify salt with iodine to combat goiter in specific regions is an example of a policy intervention based on an understanding of:
(A) Environment and Human Health
(B) The Rimland Theory
(C) Electoral Behaviour
(D) Cultural Heritage

208. The rise of supranational bodies like the European Union is a key topic under:
(A) Trends and Developments in Political Geography
(B) Disease Ecology
(C) Social Structure in India
(D) Cultural Ecology

209. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The spatial distribution of tribes in India shows significant concentration in hilly and forested areas of central and north-eastern India.
Reason (R) : Historically, these relatively isolated regions provided shelter and resources for tribal communities to maintain their distinct socio-cultural identity.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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210. Which one of the following is not a primary determinant of electoral behaviour in India?
(A) Development and governance issues
(B) Party ideology and leadership
(C) The country's GDP growth rate in the 18th century
(D) Caste and community mobilisation

211. The seasonal variation in the incidence of vector-borne diseases like malaria is an aspect of its:
(A) Political geography
(B) Spatial and seasonal distributional patterns
(C) Cultural heritage
(D) Geopolitical significance

212. The study of the strategic importance of choke points like the Bab-el-Mandeb or the Strait of Malacca is central to the:
(A) Geopolitics of the Indian Ocean
(B) Geography of Federalism
(C) Concept of Social Well-being
(D) Study of Nutritional Status

213. Consider the following issues:
1. Disputes over shared river basins between countries.
2. International competition for deep-sea mineral rights.
3. The influence of oil-producing nations on global politics.
4. The architectural design of ancient granaries.

Which of the above are examples of issues studied under the 'Geopolitics of World Resources'?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

214. The concept of 'Quality of Life' is:
(A) A purely economic measure based strictly on income and wealth.
(B) A multidimensional concept including wealth, health, environment, and social belonging.
(C) A term used only in political geography to describe stable states.
(D) An unmeasurable and purely philosophical idea with no practical use.

215. The establishment of Special Economic Zones (SEZs) in India, which operate under different economic regulations from the rest of the country, can be analyzed under:
(A) The Geography of Federalism
(B) Disease Ecology
(C) The Heartland Theory
(D) Cultural Heritage

216. Consider the following statements and select the correct option.
Statement I : A cultural region is defined by the presence of a single, uniform cultural trait.
Statement II : A cultural region is characterized by a set of cultural traits that are more prevalent within the region than outside it.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

217. In the context of India, the states of Nagaland, Mizoram, and Meghalaya have a high concentration of which religious group?
(A) Jain
(B) Buddhist
(C) Christian
(D) Zoroastrian

218. The international body that best fits the description "Regional Organisations of Cooperation" among the following is:
(A) The United Nations Security Council
(B) The International Monetary Fund
(C) The Association of Southeast Asian Nations (ASEAN)
(D) The World Health Organization

219. The study of the political fallout from a country building a dam on a river that also flows through a neighboring downstream country is an example of:
(A) Neopolitics of World Natural Resources
(B) Cultural Convergence
(C) Medical Tourism
(D) Social Structure

220. The feeling of being "left out" or marginalized from the mainstream of society is the core of the concept of:
(A) Social Exclusion
(B) Cultural Ecology
(C) Social Well-being
(D) Geopolitics

221. Consider the following topics:
1. Boundaries and Frontiers (with special reference to India)
2. Heartland and Rimland Theories
3. Geography of Federalism
4. Geopolitics of Climate Change
5. Diseases Ecology

Which of the above aspects are covered under the study of 'Political Geography'?
(A) 1 and 5 only
(B) 1, 2, 3 and 4 only
(C) 5 only
(D) 1, 2, 3, 4 and 5

222. The fact that the Santhal tribe has a different language, social organization, and relationship with the forest compared to a non-tribal group in the same region highlights the importance of:
(A) Cultural and Social Geography
(B) Geopolitics of the Indian Ocean
(C) Electoral Reforms
(D) The Rimland Theory

223. The 'Ayushman Bharat' scheme in India is a major national policy related to:
(A) Health Care Planning
(B) Electoral Reform
(C) Border Management
(D) Cultural Heritage Preservation

224. Consider the following statements and select the correct option.
Statement I : 'Neopolitics of World Natural Resources' refers to the historical study of resource use before the 20th century.
Statement II : 'Neopolitics' implies a focus on

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contemporary and emerging political dynamics related to resources in a globalized context.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

225. Match List I with List II regarding Indian states/ regions and dominant language families and select the correct option using the codes given below.
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List II: (Dominant Language Family)
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3. Dravidian
4. Indo-Aryan
Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-1, R-3, S-4

226. Which of the following is a direct example of a 'determinant of electoral behaviour'?
(A) The geological age of the rocks in the constituency.
(B) A voter's decision based on the government's performance on economic issues.
(C) The migration patterns of birds over the region.
(D) The average annual rainfall.

227. The concept of 'cultural landscape', where human cultures shape the natural landscape into a culturally significant space, is most related to:
(A) Cultural Ecology
(B) Social Exclusion
(C) Geopolitics
(D) Electoral Reforms

228. The creation of the European Union, which involves member states yielding some sovereignty to a higher authority, is an example of:
(A) A Social Process
(B) A Trend in Political Geography (Supranationalism)
(C) A Cultural Complex
(D) A Disease Ecology pattern

229. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : Medical tourism poses both opportunities and challenges for the host country's healthcare system.
Reason (R) : While it brings in foreign revenue, it can also lead to a 'brain drain' of medical professionals towards high-paying private sector jobs catering to foreigners, potentially straining public health services.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

230. The MacMahon Line is a boundary of significance in the political geography of:
(A) India
(B) The European Union
(C) South America
(D) Africa

231. The term 'Social well-being' includes aspects like:
(A) A nation's military strength.
(B) Health, education, income, and social inclusion.
(C) The number of political parties.
(D) The length of a country's coastline.

232. The idea that whoever controls the Eurasian "Rimland" would control the world was a geopolitical argument made by:
(A) Halford Mackinder
(B) Nicholas Spykman
(C) Julian Steward
(D) Karl Haushofer

233. Consider the following:
1. The Taj Mahal
2. Classical Bharatanatyam dance
3. The Vedas and Upanishads
4. A newly built smartphone factory
5. The latest electoral reforms
Which of the above are examples of India's

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aimed at improving public health outcomes. These planning initiatives often involve creating a hierarchical network of health facilities, from primary health centers in rural areas to specialized hospitals in urban centers, with the goal of ensuring geographical accessibility and equitable service delivery. Policies are designed to tackle major health challenges, including communicable diseases, maternal and child mortality, and nutritional deficiencies. A distinct and growing phenomenon within this landscape is Medical Tourism in India. Leveraging its strengths in advanced medical technology, skilled healthcare professionals, and relatively lower costs compared to Western countries, India has become a significant destination for international patients seeking a range of treatments. This influx not only contributes to the national economy but also drives the development of high-end medical infrastructure, primarily in major metropolitan areas. However, it also raises questions about equity and the potential diversion of resources from the public health system that serves the majority of the domestic population.

Based on the above source, attempt the following five questions.

276. What is a primary goal of health care planning in India as mentioned in the paragraph?
(A) To ensure geographical accessibility and equitable service delivery.
(B) To exclusively promote Medical Tourism.
(C) To reduce the number of healthcare professionals.
(D) To privatize all public health facilities.

277. The paragraph describes Medical Tourism in India as a phenomenon driven by:
(A) A lack of skilled professionals and high costs.
(B) The prevalence of traditional and alternative medicine only.
(C) Government policies discouraging foreign patients.
(D) Advanced technology, skilled professionals, and lower costs.

278. A potential concern raised in the paragraph regarding Medical Tourism is:
(A) The decline in the quality of medical technology.
(B) The potential diversion of resources from the public health system.
(C) The lack of interest from international patients.
(D) The decrease in the national economy's growth.

279. Health care planning in India involves the creation of a hierarchical network of facilities in order to:
(A) Concentrate all specialized services in rural areas.
(B) Discourage the use of primary health centers.
(C) Improve geographical access to healthcare.
(D) Make healthcare more expensive for the average citizen.

280. According to the text, the development of high-end medical infrastructure driven by Medical Tourism is primarily concentrated in:
(A) Rural and remote villages.
(B) Coastal and tourist areas.
(C) Border regions of the country.
(D) Major metropolitan areas.

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Direction : Please read the following source carefully.

Political geography analyzes the spatial expression of political processes, with a foundational focus on concepts like boundaries and frontiers. A boundary is a clearly defined line separating the territories of different political states, whereas a frontier is a zone of separation, often sparsely populated and not fully integrated into the state. India's boundaries with its neighbours provide a pertinent case study of these concepts, showcasing varied demarcation statuses from settled lines to disputed territories. Classical geopolitical theories offer frameworks for understanding global power dynamics based on geographical location. Sir Halford Mackinder's Heartland Theory posited that control over the Eurasian landmass, the "Heartland," was key to world domination. In response, Nicholas Spykman's Rimland Theory argued that the coastal fringes of Eurasia, the "Rimland," held greater strategic importance. Spykman famously stated, "Who controls the Rimland rules Eurasia; who rules Eurasia controls the destinies of the world." These theories, though developed in a different

(A) Medical Geography
(B) Political Geography
(C) Geopolitics of Resources
(D) Cultural Heritage

244. Consider the following statements and select the correct option.
Statement I : Social exclusion is a voluntary process where individuals choose to isolate themselves.
Statement II : Social exclusion is a process through which individuals or groups are systematically blocked from rights, opportunities, and resources that are normally available to members of a different group.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

245. Match List I with List II regarding organizations and their primary geographical focus and select the correct option using the codes given below.
List I: (Organization)
P. SAARC
Q. EU
R. ASEAN
S. OPEC
List II: (Region)
1. Southeast Asia
2. South Asia
3. Europe
4. Primarily Middle East (for core members)
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-2, Q-3, R-1, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-1, S-3

246. The concept of "Neopolitics of World Natural Resources" primarily deals with:
(A) The geological processes that create natural resources.
(B) The political conflicts and strategies concerning resource control in the contemporary era.
(C) The cultural valuation of natural landscapes.
(D) The historical trade of resources in ancient times.

247. Which of the following best illustrates a 'Social Process'?
(A) The water cycle
(B) Urbanization and the resulting changes in social relationships
(C) The formation of a mountain range
(D) The changing of the seasons

248. The introduction of Electronic Voting Machines (EVMs) and the Voter Verifiable Paper Audit Trail (VVPAT) in India are significant:
(A) Cultural traditions
(B) Electoral Reforms
(C) Geopolitical doctrines
(D) Health policies

249. Read the assertion and reason carefully and select the correct option from the following.
Assertion (A) : The Rimland theory is considered a cornerstone of classical geopolitics.
Reason (R) : It provided a maritime-based strategic counter-perspective to Mackinder's land-based Heartland theory, influencing geopolitical thought for decades.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

250. The study of how the cultural practices of a community, such as food habits and sanitation customs, can influence the spread of disease falls under:
(A) Disease Ecology
(B) Geopolitics of Climate Change
(C) Geography of Federalism
(D) Heartland Theory

Direction : Please read the following source carefully.

The study of cultural geography hinges on understanding the foundational concept of culture itself, which encompasses the shared beliefs, practices, and artifacts of a group. This culture manifests spatially through several hierarchical concepts. A cultural complex is a distinct combination of cultural traits, while a cultural area is a region where a particular cultural complex is predominant. Expanding further, a

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288. The paragraph links the Geography of Federalism in India to which other field of study?
(A) Disease Ecology
(B) Electoral Geography
(C) Cultural Heritage
(D) Medical Tourism

289. What is an example of an electoral reform in India mentioned in the text?
(A) The creation of new political parties.
(B) The implementation of a new foreign policy.
(C) The establishment of SAARC.
(D) Changes in constituency delimitation.

290. The overall purpose of analyzing electoral behaviour from a geographical perspective is to:
(A) Provide insights into the functioning of democracy and regional political variations.
(B) Predict the winner of every election with absolute certainty.
(C) Promote a single, unified political ideology across the nation.
(D) Eliminate all regional differences in voting patterns.

Direction : Please read the following source carefully.

Modern international relations are increasingly shaped by the geopolitics of shared global challenges and resources. The Geopolitics of Climate Change, for instance, examines the strategic implications of global warming, including conflicts over melting Arctic routes, disputes arising from sea-level rise, and competition for resources in drought-affected regions. Similarly, the Geopolitics of World Resources analyzes the contest for control over vital materials like oil, water, and rare earth minerals, which are unevenly distributed across the globe and are essential for economic and military power. Within this framework, the Geopolitics of the India Ocean has gained immense prominence. As a critical artery for global trade and energy flows, the Indian Ocean region has become a theatre for strategic competition among major powers, each seeking to secure its interests, establish naval presence, and influence the littoral states. The interplay of these geopolitical forces demonstrates that contemporary power politics is intrinsically linked to the control, management, and strategic exploitation of geographical spaces and resources on a global scale.

Based on the above source, attempt the following five questions.

291. The Geopolitics of Climate Change is described as examining which of the following?
(A) The biological evolution of species due to climate shifts.
(B) The history of past ice ages and their geological impact.
(C) The strategic implications and potential conflicts arising from global warming.
(D) The cultural perceptions of weather in different societies.

292. According to the paragraph, why has the Geopolitics of the Indian Ocean gained prominence?
(A) It is a critical artery for global trade and energy flows.
(B) It is the only ocean free from strategic competition.
(C) It has the world's largest reserves of freshwater.
(D) It is geographically isolated and irrelevant to major powers.

293. The Geopolitics of World Resources primarily focuses on:
(A) The equal and fair distribution of all resources.
(B) The cultural significance of resources in traditional societies.
(C) The development of synthetic substitutes for all natural resources.
(D) The contest for control over vital and unevenly distributed materials.

294. Which of the following is mentioned as a specific issue within the Geopolitics of Climate Change?
(A) The planning of health care in response to new diseases.
(B) Conflicts over melting Arctic routes.
(C) The linguistic evolution due to population migration.
(D) Electoral reforms in nations affected by sea-level rise.

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295. The central theme of the paragraph is that contemporary power politics is:
(A) No longer influenced by geographical factors.
(B) Determined solely by military strength,

adaptation or by intercultural contact and global integration.

Based on the above source, attempt the following five questions.

256. Which concept specifically investigates the adaptation of human societies to their physical surroundings?
(A) Cultural Convergence
(B) Cultural Ecology
(C) Cultural Heritage
(D) Cultural Complex

257. According to the paragraph, Cultural Convergence is primarily driven by forces that lead to:
(A) The strengthening of distinct and isolated cultural traits.
(B) The development of unique adaptations to local environments.
(C) The complete rejection of modern technology by traditional societies.
(D) Increased similarity and uniformity among different cultures.

258. What is the main difference highlighted between Cultural Ecology and Cultural Convergence?
(A) Cultural Ecology explains cultural divergence due to environment, while Cultural Convergence explains cultural homogenization.
(B) Cultural Ecology focuses on intercultural contact, while Cultural Convergence focuses on environmental adaptation.
(C) Cultural Ecology is a modern process, whereas Cultural Convergence is a historical one.
(D) Cultural Ecology deals with urban societies, while Cultural Convergence deals with rural ones.

259. The paragraph suggests that cultural landscapes are a product of:
(A) The complete dominance of culture over the natural environment.
(B) The universal process of cultural convergence erasing local distinctiveness.
(C) The long-term interaction and adaptation between a human society and its environment.
(D) The political demarcation of boundaries without regard for cultural practices.

260. Which of the following is described as a force driving Cultural Convergence?
(A) Globalization and mass media
(B) Environmental constraints
(C) Geographical isolation
(D) Development of unique local technologies

Direction : Please read the following source carefully.

Social geography examines the spatial patterns of social life and the relationships between social structures, processes, and the spaces they occupy. A core element is the social structure, the patterned social arrangements in society that emerge from and determine the actions of individuals. These structures are manifested through social processes, such as cooperation, conflict, and exclusion. The outcomes of these processes are often measured through indicators of Social Well-being and Quality of Life, which assess the extent to which people's needs and desires are met in terms of health, education, income, and personal freedom. However, not all members of a society have equal access to these benefits. The concept of Social Exclusion refers to the process through which individuals or groups are systematically blocked from rights, opportunities, and resources that are normally available to members of a different group. This can result in spatial segregation, where marginalized communities are concentrated in areas with poorer services and fewer opportunities, thereby perpetuating a cycle of disadvantage. Understanding the spatial dimensions of social well-being and exclusion is crucial for formulating equitable social policies and planning interventions.

Based on the above source, attempt the following five questions.

261. What concept refers to the process of systematically blocking individuals or groups from societal rights and resources?
(A) Social Well-being
(B) Social Structure
(C) Social Process
(D) Social Exclusion

262. According to the text, Social Well-being and Quality of Life are used to:

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(A) Measure the degree of social conflict within a community.
(B) Assess the extent to which people's needs and desires are met.
(C) Define the formal political structure of a society.
(D) Map the physical boundaries of social groups.

263. The paragraph suggests that a direct spatial consequence of Social Exclusion can be:
(A) The uniform distribution of resources across all communities.
(B) The creation of policies promoting equal opportunity.
(C) The concentration of marginalized communities in disadvantaged areas.
(D) The enhancement of social well-being for all members of society.

264. What is the relationship between social structure and social processes as described in the paragraph?
(A) Social processes are independent of the social structure.
(B) Social structure is solely concerned with economic arrangements, while processes are cultural.
(C) Social processes exist only in the absence of a defined social structure.
(D) Social structure emerges from and determines social processes like conflict and cooperation.

265. The primary focus of the social geography concepts discussed in the paragraph is on:
(A) The relationships between social phenomena and the spaces they occupy.
(B) The purely economic transactions between different regions.
(C) The physical and climatic characteristics of a place.
(D) The historical evolution of political ideologies.

Direction : Please read the following source carefully.

The social geography of India presents a complex mosaic characterized by the spatial distribution of diverse social groups, defined by tribe, caste, religion, and language. The spatial arrangement of these groups is not random but is a product of historical migrations, political configurations, and socio-economic processes. Tribal populations, for instance, are often concentrated in specific geographical pockets, such as the hilly and forested tracts of Central and North-East India, reflecting a historical relationship with particular ecological niches. The caste system, though constitutionally abolished as a basis for discrimination, continues to influence settlement patterns and social interactions, particularly in rural landscapes. Similarly, the distribution of religious groups, such as Hindus, Muslims, Christians, and Sikhs, shows significant regional variations, creating distinct religio-cultural regions across the country. Language, as a potent marker of identity, delineates major linguistic regions, with the political map of India's states largely conforming to these divisions. Understanding the unique spatial distribution patterns of each of these social groups is fundamental to analyzing regional identities, social dynamics, and the challenges of national integration in India.

Based on the above source, attempt the following five questions.

266. According to the paragraph, the spatial distribution of tribal populations in India is often associated with which type of geographical areas?
(A) Coastal plains and major urban centers
(B) Hilly and forested tracts
(C) Fertile river valleys and agricultural heartlands
(D) Arid and semi-arid desert regions

267. The text suggests that the political map of India's states largely corresponds to the spatial divisions based on:
(A) Religion
(B) Language
(C) Caste
(D) Tribe

268. What does the paragraph imply about the spatial arrangement of social groups in India?
(A) It is a product of historical, political, and socio-economic processes.
(B) It is a recent phenomenon driven solely by modern economic factors.
(C) It is a random and unpredictable distribution

with no clear patterns.
(D) It is uniform across the country with little regional variation.

269. The paragraph states that the distribution of religious groups in India results in the creation of:
(A) Uniform national religious identity.
(B) The complete absence of religious conflict.
(C) Distinct religio-cultural regions.
(D) Political boundaries based on religion.

270. Which social factor is mentioned as continuing to influence settlement patterns, particularly in rural India, despite constitutional changes?
(A) Tribal identity
(B) Linguistic affiliation
(C) Recent migration trends
(D) The caste system

Direction : Please read the following source carefully.

The intersection of geography and health is critical for understanding human well-being, particularly in the context of India. The relationship between the environment and human health is multifaceted, as environmental factors can both support and threaten health. Disease Ecology is a specialized field that studies the spatial and temporal patterns of diseases by examining the interactions among hosts, pathogens, and the environment. This is crucial for understanding the prevalence of various illnesses. Equally important is the nutritional status of the population, which is influenced by a range of etiological conditions including poverty, food availability, and cultural practices. Nutritional deficiencies and excesses can be classified and mapped to reveal distinct spatial and seasonal distributional patterns. In India, for example, certain regions may exhibit higher rates of protein-energy malnutrition, while others may show seasonal spikes in vector-borne diseases linked to monsoon patterns. Analyzing these spatial and seasonal distributions is not merely an academic exercise; it is essential for effective public health interventions, allowing for targeted resource allocation and preventative strategies that are sensitive to local geographical and environmental contexts.

Based on the above source, attempt the following five questions.

271. What is the primary focus of Disease Ecology as described in the paragraph?
(A) The financial cost of healthcare services.
(B) The classification of pharmaceutical drugs.
(C) The study of interactions among hosts, pathogens, and the environment.
(D) The political policies governing hospital administration.

272. The paragraph identifies "etiological conditions" as a key factor influencing:
(A) The political geography of a region.
(B) The nutritional status of a population.
(C) The architectural design of hospitals.
(D) The process of cultural convergence.

273. According to the text, why is the analysis of spatial and seasonal distributional patterns of disease and nutrition important?
(A) It helps in promoting medical tourism.
(B) It serves only to fulfill an academic requirement.
(C) It determines the linguistic boundaries of a region.
(D) It is essential for effective and targeted public health interventions.

274. The text provides an example of a seasonal distributional pattern in India related to:
(A) An increase in vector-borne diseases linked to monsoon patterns.
(B) Higher rates of malnutrition during festivals.
(C) A decrease in birth rates during winter.
(D) Spikes in industrial accidents during the summer.

275. The relationship between the environment and human health is described as:
(A) Purely supportive, with no negative impacts.
(B) Entirely threatening, with no positive aspects.
(C) Multifaceted, capable of both supporting and threatening health.
(D) Irrelevant to the study of geography.

Direction : Please read the following source carefully.

The landscape of healthcare in India is shaped by concerted efforts in health care planning and the implementation of national policies

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'Cultural Heritage'?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1 and 2 only
(D) 1, 2, 3, 4 and 5

234. The spread of fast-food chains like McDonald's to countries all over the world is a prominent example of:
(A) Cultural Convergence
(B) Social Exclusion
(C) Disease Ecology
(D) Geography of Federalism

235. An Indian government policy that focuses on improving health infrastructure in rural and underserved areas is a core component of:
(A) Health Care Planning and Policies in India
(B) Geopolitics of the Indian Ocean
(C) Cultural Ecology
(D) Electoral Reforms

236. Consider the following statements and select the correct option.
Statement I : The Indian federal system is perfectly symmetrical, with all states having identical powers.
Statement II : The 'Geography of Federalism' in India examines the spatial variations in power and governance, including provisions for special category states.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

237. The study of the distribution and concentration of the Sikh population primarily in Punjab is a topic within:
(A) The spatial distribution of social groups (Religion) in India
(B) The Heartland Theory
(C) The Geopolitics of Climate Change
(D) Medical Tourism

238. The main purpose of the Association of Southeast Asian Nations (ASEAN) is:
(A) To control global oil prices.
(B) To accelerate economic growth, social progress, and cultural development in the region.
(C) To form a political union of all Asian countries.
(D) To manage the borders of its member states.

239. A classification of diseases based on their mode of transmission (e.g., water-borne, air-borne, vector-borne) is fundamental to the study of:
(A) Disease Ecology
(B) Cultural Heritage
(C) Electoral Behaviour
(D) Geopolitics

240. The strategic and political issues arising from multiple countries laying claim to the resources of the Arctic Ocean as its ice melts are a prime example of:
(A) Geopolitics of Climate Change
(B) Social Well-being
(C) Cultural Convergence
(D) Medical Tourism

241. Consider the following statements regarding "Boundaries and Frontiers":
1. Boundaries are fixed lines, while frontiers are transitional zones.
2. Boundaries can be sources of international conflict.
3. The demarcation of boundaries often has significant social and economic consequences.
4. Frontiers are more common in the modern, fully partitioned world than boundaries.
5. In modern states, boundaries and frontiers are identical concepts.

Which of the above statements are correct?
(A) 1, 2 and 3 only
(B) 4 and 5 only
(C) 1, 4 and 5 only
(D) 1 and 2 only

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242. The system of social stratification unique to India, which has significant spatial manifestations, is the:
(A) Caste system
(B) Federal system
(C) Electoral system
(D) Health care system

243. The study of the relationship between diet, nutritional deficiencies, and the prevalence of specific diseases in a population is central to:

historical context, continue to influence strategic thinking by highlighting the enduring importance of geography in international relations and the perpetual contest for spatial advantage.

Based on the above source, attempt the following five questions.

281. What is the key difference between a boundary and a frontier as described in the paragraph?
(A) A boundary is a clearly defined line, whereas a frontier is a zone of separation.
(B) A boundary is a zone, whereas a frontier is a line.
(C) Boundaries are natural, while frontiers are always artificially created.
(D) Frontiers are densely populated, whereas boundaries are uninhabited.

282. The Heartland Theory, proposed by Sir Halford Mackinder, identified which area as the key to world domination?
(A) The North American continent
(B) The Eurasian landmass (Heartland)
(C) The coastal fringes of Eurasia (Rimland)
(D) The maritime routes of the Indian Ocean

283. Which geopolitical theorist is credited with the Rimland Theory as a response to the Heartland Theory?
(A) Sir Halford Mackinder
(B) Nicholas Spykman
(C) Alfred Mahan
(D) Friedrich Ratzel

284. Spykman's Rimland Theory conferred the greatest strategic importance to:
(A) The coastal fringes surrounding the Eurasian landmass.
(B) The central, inaccessible landmass of Eurasia.
(C) The sparsely populated frontier zones.
(D) The political capitals of major world powers.

285. The paragraph uses India's relationship with its neighbours as a special reference to illustrate the concepts of:
(A) Cultural Convergence and Divergence.
(B) Medical Tourism policies.
(C) Boundaries and Frontiers.
(D) Electoral behaviour determinants.

Direction : Please read the following source carefully.

Contemporary political geography has evolved to analyze modern political dynamics and their spatial dimensions. A significant trend is the study of the Geography of Federalism, which examines how power is divided and shared between national and sub-national units of government and how this arrangement impacts regional development and political stability. In the context of India, this is closely linked to electoral geography. The analysis of electoral reforms in India, such as changes in constituency delimitation or voting procedures, is crucial for understanding political representation. Furthermore, geographers study the determinants of electoral behaviour, exploring how spatial factors like regional identity, urban-rural divides, and local issues influence voting patterns. These determinants are not static; they are shaped by socio-economic conditions, political campaigns, and the historical context of a region. By mapping and analyzing these behaviours, political geography provides insights into the functioning of democracy, the nature of political power, and the reasons behind regional variations in electoral outcomes, moving beyond simple political analysis to incorporate the vital element of space.

Based on the above source, attempt the following five questions.

286. The Geography of Federalism is primarily concerned with:
(A) The history of international treaties.
(B) The determinants of voter turnout in a single election.
(C) The geopolitical theories of Heartland and Rimland.
(D) The spatial division of power between national and sub-national governments.

287. According to the paragraph, the study of determinants of electoral behaviour explores how:
(A) International relations influence local elections.
(B) Only economic factors decide election outcomes.
(C) Spatial factors like regional identity and urban-rural divides influence voting.
(D) All voters behave in a uniform and predictable manner.

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cultural region represents a broader territory inhabited by people who share significant cultural traits, often forming a cohesive identity. These regions are not static; they are dynamic spaces shaped by historical processes and interactions. A critical component within this framework is cultural heritage, which includes both tangible elements like monuments and intangible elements like traditions and languages, preserved as a legacy for future generations. The demarcation and study of these cultural areas and regions are fundamental to understanding the spatial mosaic of human societies and how distinct identities are formed, maintained, and geographically expressed over time. The interaction between these concepts creates a complex tapestry of human geography, where cultural identity is intrinsically linked to place.

Based on the above source, attempt the following five questions.

251. Which concept represents a distinct combination of individual cultural traits that form an interconnected system?
(A) Cultural Region
(B) Cultural Complex
(C) Cultural Heritage
(D) Cultural Area

252. According to the paragraph, what is the primary distinction between a cultural area and a cultural region?
(A) A cultural region is a broader territory sharing significant traits compared to a more specific cultural area.
(B) A cultural area is tangible, whereas a cultural region is intangible.
(C) A cultural area is defined by political boundaries, while a cultural region is defined by language.
(D) A cultural region is static, whereas a cultural area is dynamic and subject to change.

253. The paragraph defines cultural heritage as encompassing which two types of elements?
(A) Economic and political elements
(B) Historical and futuristic elements
(C) Tangible and intangible elements
(D) Social and environmental elements

254. Based on the source, what is the fundamental purpose of studying cultural areas and regions?
(A) To promote a single global culture by eliminating regional differences.
(B) To establish rigid boundaries between different cultural groups for administrative purposes.
(C) To focus exclusively on the economic development of culturally distinct zones.
(D) To understand the spatial mosaic and geographical expression of human societies and identities.

255. The paragraph implies that cultural regions are:
(A) Unchanging and permanent geographical fixtures.
(B) Exclusively defined by physical geographical features.
(C) Dynamic spaces shaped by historical processes and interactions.
(D) Irrelevant to the formation of group identity.

Direction : Please read the following source carefully.

The relationship between culture and the environment is a central theme explored through the concept of Cultural Ecology, which investigates how human societies adapt to their physical surroundings. This adaptation is not merely passive; it involves a dynamic interplay where cultural practices, technologies, and social structures are developed or modified in response to environmental opportunities and constraints. The resulting cultural landscapes are a testament to this long-term interaction. In contrast, the process of Cultural Convergence addresses the interactions between different cultures. It describes the tendency for cultures to become more alike as they increasingly share technology and organizational structures in a modern, interconnected world. This convergence can be driven by forces such as globalization, migration, and mass media, leading to the erosion of distinct cultural traits and the adoption of more uniform practices. While Cultural Ecology emphasizes adaptation and divergence in response to varied environments, Cultural Convergence points towards a potential homogenization of cultures. Understanding both processes is crucial for analyzing the complex dynamics of cultural change, whether it is driven by environmental

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irrespective of location.
(C) Intrinsically linked to the control and strategic use of geographical spaces and resources.
(D) Managed exclusively by cooperative international organizations without competition.

Direction : Please read the following source carefully.

In an increasingly interconnected world, Regional Organisations of Cooperation play a vital role in shaping political and economic landscapes. Organisations such as SAARC (South Asian Association for Regional Cooperation), ASEAN (Association of Southeast Asian Nations), OPEC (Organization of the Petroleum Exporting Countries), and the EU (European Union) represent different models of regional integration, each with specific goals. While SAARC has aimed for economic and social upliftment in South Asia, ASEAN focuses on accelerating economic growth and promoting regional peace in Southeast Asia. The EU represents the deepest form of integration, with a single market and significant political union. OPEC, in contrast, is a cartel focused on coordinating the petroleum policies of its member countries. Complementing this is the study of the Neopolitics of World Natural Resources, which examines the contemporary political dynamics surrounding resource control. This new political game is not just about state-centric competition but also involves non-state actors, transnational corporations, and a complex interplay of supply chain security, environmental concerns, and technological advancements, redefining the strategic value and control of natural resources in the 21st century.

Based on the above source, attempt the following five questions.

296. Which regional organization mentioned in the paragraph is primarily a cartel focused on coordinating petroleum policies?
(A) SAARC
(B) ASEAN
(C) EU
(D) OPEC

297. According to the text, which organization represents the deepest form of regional integration, featuring a single market and significant political union?
(A) The European Union (EU)
(B) The South Asian Association for Regional Cooperation (SAARC)
(C) The Association of Southeast Asian Nations (ASEAN)
(D) The Organization of the Petroleum Exporting Countries (OPEC)

298. The concept of "Neopolitics of World Natural Resources" is distinct from traditional geopolitics because it:
(A) Exclusively focuses on historical resource conflicts.
(B) Involves non-state actors, corporations, and supply chain security.
(C) Considers only state-centric competition for resources.
(D) Ignores the role of technology and environmental concerns.

299. What is the stated primary focus of ASEAN, as described in the paragraph?
(A) Creating a political union similar to the EU.
(B) Accelerating economic growth and promoting regional peace.
(C) Coordinating the petroleum policies of its members.
(D) Addressing social exclusion within South Asia.

300. The paragraph as a whole contrasts different Regional Organisations of Cooperation to illustrate that they:
(A) Represent different models and depths of regional integration.
(B) All have identical goals and structures.
(C) Are all ineffective and obsolete.
(D) Are solely focused on military alliances.

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52. (D) Trends and Developments in Political Geography
The formation of the European Union represents a significant shift toward supranationalism, where states pool sovereignty to achieve common political and economic goals. This development is a key topic in modern political geography as it challenges traditional concepts of the nation-state and boundaries. Analyzing such organizations helps scholars understand how globalization and regional cooperation are reshaping the global political.

53. (C) 1, 2 and 3 only
Medical geography in India includes the study of nutritional status, health care planning, and the growing sector of medical tourism. These topics focus on the relationship between the environment, policy, and human health within the country. While geopolitical theories are important in other areas of geography, they do not directly address the medical and health-related concerns that define this.

54. (B) Regional Organisations of Cooperation
SAARC and ASEAN are established to promote economic, social, and cultural cooperation among neighboring states in South and Southeast Asia. These organizations facilitate regional stability and progress through shared policies and dialogue. As regional entities, they reflect the importance of geographical proximity in driving international partnerships and managing common challenges that transcend national borders in a globalized.

55. (A) 3, 2, 1, 4
Cultural entities are organized hierarchically based on their complexity and spatial extent. A cultural trait is the simplest unit of learned behavior, which combines with others to form a cultural complex. These complexes characterize a cultural region, and the largest, most overarching unit is the cultural realm. This classification allows geographers to analyze culture at various scales, from individual.

56. (C) Statement I is false, but Statement II is true.
Historically, frontiers were broad zones of transition between political entities where authority was often unclear. In contrast, modern political geography is defined by precisely demarcated boundaries that serve as legal lines of separation between sovereign states. Most traditional frontiers have been replaced by these fixed boundaries to ensure territorial clarity and manage international relations effectively in a fully partitioned.

57. (C) The contemporary political dynamics and conflicts related to the control and distribution of natural resources.
The neopolitics of world natural resources focuses on the modern struggles between states to secure access to essential resources like oil, water, and minerals. In a globalized world, the uneven distribution of these resources drives strategic alliances and international tensions. This field examines how resource control influences state power and foreign policy, highlighting the political importance of geography in.

58. (A) Cultural Heritage - Future technological innovations
Cultural heritage refers to the legacies of physical artifacts and intangible attributes inherited from past generations, rather than future technological developments. In contrast, cultural ecology correctly identifies the study of human-environment relationships, and social exclusion describes the denial of access to resources. Cultural convergence appropriately represents the merging of cultures. These concepts are fundamental for understanding the historical and.

59. (D) The combination of high-quality medical care at a comparatively lower cost.
India has become a leading destination for medical tourism because it offers advanced medical procedures and highly skilled professionals at a fraction of the cost found in Western countries. This combination of affordability and quality attracts patients globally for various treatments, including surgeries and wellness therapies. The growth of this sector is supported by government policies and contributes significantly to.

60. (B) Geopolitics of Climate Change
The competition for influence in the Arctic, triggered by melting ice and new resource access, is a classic example of the geopolitics of climate change. Environmental shifts are creating new strategic opportunities and risks, leading to

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that organize a community. These arrangements, including hierarchies and roles, provide a framework that guides human interaction and influences individual choices. Understanding this concept is essential for analyzing how societies maintain order and how social forces shape the lived experiences and opportunities of people within a specific geographical context.

9. (A) Both A and R are true and R is the correct explanation of A.
The Indian Ocean has gained immense global importance due to its role as a primary corridor for international maritime trade and transportation. It contains vital shipping lanes that connect major global economies and is a significant source of strategic underwater resources and minerals. Consequently, the geopolitical interests of littoral states and global powers are heavily focused on maintaining security and influence.

10. (A) Medical tourism in India primarily attracts patients from developed Western countries only.
Medical tourism in India is a thriving industry that draws patients from all over the world, not just Western nations. People from neighboring South Asian countries, Africa, and the Middle East also visit for high-quality, affordable healthcare. The growth of this sector is driven by skilled professionals and advanced technology, contributing significantly to the national economy through foreign exchange and global health recognition.

11. (D) Cause: A harsh physical environment; Effect: Development of specific adaptive cultural traits.
Cultural ecology focuses on the functional relationship between human populations and their natural surroundings. When faced with a challenging physical environment, societies must develop specialized cultural practices, such as unique building styles or farming methods, to survive. This adaptive process illustrates how environmental pressures act as a primary catalyst for the evolution of distinct cultural characteristics and social behaviors within a specific geographic region.

12. (B) The Sikh population - Highest concentration in the state of Punjab.
The spatial distribution of social and religious groups in India shows distinct regional concentrations. The Sikh community is primarily located in the state of Punjab, where it forms a significant majority and shapes the local cultural landscape. In contrast, other groups like the Bhil tribes or Dravidian language speakers are concentrated in central and southern regions, respectively, reflecting the historical and linguistic diversity.

13. (C) 1, 2 and 3 only
The geography of federalism examines the spatial organization of political power within states that have multiple tiers of government. It analyzes how resources are allocated between central and regional authorities and looks at the influence of regionalism on national stability. This field does not ignore federal systems to focus on unitary states; rather, it specifically studies the territorial dynamics inherent in shared governance.

14. (D) The process by which individuals or groups are systematically blocked from rights, opportunities, and resources.
Social exclusion occurs when certain segments of the population are marginalized and denied access to standard societal benefits and services. This process is often driven by factors like caste, religion, or economic status, leading to a lack of participation in political and economic life. Understanding this phenomenon is crucial for geographers as it reveals spatial patterns of deprivation and the unequal distribution.

15. (A) The maritime fringes of Eurasia
Nicholas Spykman proposed the Rimland Theory as a response to the Heartland concept, arguing that the coastal areas of Eurasia were the most strategic. He believed that the maritime fringes, having access to both land and sea resources, were the keys to controlling the World-Island. This theory emphasizes the importance of coastal regions in global power dynamics and suggests that sea power.

16. (C) Statement I is true, but Statement II is false.
A cultural complex is defined as a group of individual cultural traits that work together to form a meaningful whole. While a single tool or habit is a simple trait, it naturally becomes part of a larger complex when integrated into broader social practices or belief systems. For example,

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is organized across the landscape. By identifying these regions, scholars can better examine the interactions between different.

70. (B) Nutritional Status and its classification
Political geography focuses on the spatial organization of power, territory, and international relations, including boundaries and the geopolitics of resources. It examines how geography influences governance and political conflict at various scales. While nutritional status is a critical geographic topic, it belongs to the sub-discipline of medical or social geography rather than the political study of states and.

71. (C) Type of protein-energy malnutrition
Nutritional status is classified based on the health outcomes resulting from nutrient intake and utilization. Conditions like Kwashiorkor and Marasmus are specific types of protein-energy malnutrition that indicate severe dietary deficiencies. This classification is essential for health geographers to identify regions of high risk and plan interventions. It focuses on the physiological and etiological aspects of human health rather than.

72. (B) Cultural Convergence
The adoption of English as a common language for global business and science is a prominent example of cultural convergence. This process occurs as different societies become more similar through the sharing of traits, often driven by international trade and globalization. As a global lingua franca, English facilitates communication across cultural boundaries, leading to a more integrated and.

73. (B) 2, 3 and 4 only
The geopolitics of world resources analyzes how the uneven spatial distribution of essential materials like oil and water influences state power and foreign policy. Competition for these strategic resources is a frequent source of international tension and conflict. Furthermore, the political and economic stability of various regions is often deeply linked to their resource wealth and the ability.

74. (B) An examination of the relationship between environmental factors (physical, biological, social) and health outcomes.
The study of environment and human health investigates how physical, biological, and social surroundings impact the well-being of populations. Geographers analyze the links between pollution, climate, and the prevalence of diseases to understand spatial health patterns. This interdisciplinary approach highlights the importance of environmental management in preventing illness and improving the quality of life, moving beyond purely medical.

75. (A) Spatial distribution of language groups and geography of federalism
The reorganization of Indian states along linguistic lines is a practical application of the geography of federalism and the spatial distribution of language groups. This policy recognizes that cultural and linguistic identity is often tied to specific regions, and managing these identities is essential for a stable federal system. By aligning political boundaries with linguistic areas, the government aims to.

76. (C) Statement I is false, but Statement II is true.
Social well-being is a multidimensional concept that includes various factors beyond income, such as health and education. Quality of life is an even broader term that encompasses social well-being along with environmental quality and personal freedoms. While income is a component, it does not fully capture the human experience or the overall condition of a society. Understanding these.

77. (A) 1, 4, 2, 3
Regional organizations are distributed geographically across the globe, reflecting the spatial focus of their member states. Moving from West to East, the European Union is centered in Europe, followed by OPEC with its core members in the Middle East. SAARC focuses on South Asia, while ASEAN is located further east in Southeast Asia. This distribution highlights how regional cooperation is.

78. (B) A discrete combination of functionally interrelated cultural traits, such as those associated with a particular sport or religion.
A cultural complex consists of a set of interrelated traits that form a functional unit within a culture. These traits, such as the beliefs, practices, and artifacts associated with a specific religion

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25. (B) P-4, Q-1, R-2, S-3
The religious groups in India are distributed across various regions with specific areas of concentration. Buddhists are notably found in Ladakh, Sikkim, and Arunachal Pradesh, while Jains have significant populations in Gujarat, Rajasthan, and Maharashtra. Muslims are concentrated in Jammu and Kashmir, Kerala, and West Bengal, and the Parsi community is primarily located in Mumbai and Gujarat, reflecting historical settlement patterns.

26. (A) A region inhabited by people who have one or more cultural traits in common.
A cultural area is a geographical unit where the population shares a set of distinct cultural characteristics, such as language, religion, or social customs. This concept helps geographers map the spatial extent of specific lifestyles and understand how cultural identities are anchored to the land. By identifying these regions, scholars can analyze the diffusion of cultural traits and the interactions between different.

27. (C) Statement I is true, but Statement II is false.
Mackinder's Heartland Theory identifies the World-Island as the interlinked landmasses of Europe, Asia, and Africa. He argued that land power, rather than sea power, would become the dominant force in global politics due to the strategic advantages of the interior Eurasian core. This perspective challenged the traditional emphasis on naval control and suggested that the vast resources of the heartland.

28. (B) Cultural Convergence
Cultural convergence refers to the process where different societies become more similar as they adopt shared cultural traits, such as food, music, and fashion. This phenomenon is often driven by globalization and the rapid exchange of information through modern media and technology. As global chains and trends spread, local traditions may merge with international influences, leading to a more homogenous global cultural.

29. (A) Both A and R are true and R is the correct explanation of A.
The nutritional status of the Indian population varies across different regions and times of the year due to environmental and economic factors. Seasonal shifts in food availability, the types of crops harvested, and the prevalence of certain diseases directly impact health outcomes. Consequently, spatial and temporal patterns in nutrition are a result of the complex interaction between agricultural cycles and local environmental.

30. (C) The electoral behavior of citizens in a specific constituency.
Geographers studying environment and human health focus on how physical factors like air quality, water safety, and climate influence the spread of diseases. They analyze the spatial relationship between pollution and respiratory issues or how weather affects vector-borne illnesses. While political behavior is a valid area of geographic study, it belongs to the sub-discipline of electoral geography rather than the health.

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31. (A) Social Geography
Social geography examines the spatial distribution and organization of social groups, including those defined by caste, class, and ethnicity. In the Indian context, the study of where different castes live and how they interact within the village or urban landscape is a core theme. This analysis helps understand the social structure and the processes that lead to residential segregation or.

32. (B) The potential for international conflict and cooperation arising from the impacts of climate change.
The geopolitics of climate change investigates how environmental shifts like rising sea levels or resource scarcity affect international relations and state power. It examines the risks of conflict over water and land, as well as the opportunities for global cooperation through climate treaties. This field analyzes how the physical impacts of a warming planet reshape political boundaries and the strategic interests.

33. (C) 1, 2 and 3 only
Electoral reforms in India are aimed at enhancing the transparency and fairness of the democratic process. These measures include the adoption of technology like Electronic Voting Machines and addressing the influence of money and criminal elements in politics. While these reforms seek to improve the existing system, they do not aim to

eliminate the multi-party structure, which is a fundamental part.

34. (A) Culture
Culture provides the foundation for an individual's sense of identity and belonging through shared customs, language, and historical narratives. It is the system of meanings and behaviors that connects people within a group and distinguishes them from others. This collective identity influences how groups interact with their environment and shapes the social structure of a community, making it a central.

35. (C) Heartland Theory
The Rimland Theory was proposed by Nicholas Spykman as a direct critique of Mackinder's Heartland Theory. Spykman argued that the coastal regions of Eurasia were more vital for world control than the interior heartland. By emphasizing sea-based connections and the strategic importance of the maritime fringe, he provided an alternative geopolitical framework that influenced the containment policies of the Cold War.

36. (C) Statement I is false, but Statement II is true.
While social well-being involves personal perceptions, it can be measured using objective indicators like health data, literacy rates, and income levels. Quality of life is a broader concept that includes these objective conditions alongside subjective feelings of satisfaction and happiness. Both metrics are essential for geographers to assess the overall development and human condition within a specific region or.

37. (C) Boundaries and Frontiers
In political geography, boundaries and frontiers are the primary concepts used to analyze territorial disputes and the limits of state sovereignty. Geographers examine how these lines and zones are defined, contested, and managed between neighboring countries like India and its peers. This study involves understanding the historical, cultural, and strategic factors that shape the geographical limits and the interactions.

38. (B) An ancient temple with unique architectural features
Cultural heritage consists of the tangible and intangible assets inherited from past generations that represent a community's identity. Ancient temples with unique architecture are prime examples of tangible heritage, as they reflect the historical skills, beliefs, and artistic values of a society. Preserving these sites is essential for maintaining cultural continuity and provides a link between the history and the.

39. (D) Social Exclusion
Social exclusion is the systematic denial of rights and opportunities, such as education and employment, to specific social groups. This process creates barriers that prevent these groups from fully participating in society and accessing the resources needed for a good quality of life. Analyzing these patterns helps geographers identify regions of marginalization and understand the social forces that drive spatial.

40. (A) Neopolitics of World Natural Resources
The neopolitics of world natural resources examines how the control and distribution of vital resources like oil and water influence global power dynamics. In an era of increasing scarcity, these resources become major drivers of international competition and strategic alliances. This field of study focuses on the political consequences of resource location and the ways in which states secure.

41. (B) 2, 3 and 4 only
A frontier is historically defined as a broad zone of transition between two states where authority is not fully established. Unlike a boundary, which is a precise and legally demarcated line, a frontier often has a unique cultural character and precedes the formation of fixed limits. Understanding the difference between these concepts is vital for analyzing the territorial evolution and political.

42. (A) The causal factors leading to a particular nutritional disease.
Etiological conditions refer to the specific causes and origins of health problems, particularly nutritional diseases. In geography, this involves studying how factors like food scarcity, lack of nutrients, or poor absorption lead to conditions such as malnutrition. By identifying these causes, researchers can better understand the spatial patterns of disease and develop targeted health policies to improve the nutritional.

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43. (D) OPEC
The Organization of the Petroleum Exporting Countries is a regional and international association focused on coordinating the oil policies of its member states. Its primary goal is to stabilize petroleum markets and ensure a steady income for producer nations. As an association of major exporters, it plays a critical role in the geopolitics of world resources and influences global energy.

44. (C) Statement I is false, but Statement II is true.
India is characterized by immense linguistic diversity, with the Constitution recognizing multiple languages rather than enforcing a single uniform language across the country. While many states were organized based on linguistic lines, they often remain multilingual with various dialects and minority languages spoken within their borders. This diversity is a key feature of the social geography of India and reflects.

45. (B) P-2, Q-4, R-1, S-3
Political geography utilizes specific concepts to describe the organization of power and territory. The Heartland refers to the interior landmass of Eurasia, while the Rimland describes the maritime fringe. Federalism is the division of authority between central and regional governments, and a boundary is the line marking the limit of state sovereignty. These concepts provide a framework for analyzing global and.

46. (D) Quality of Life
Quality of life encompasses the overall well-being and satisfaction of individuals within their environment, including access to leisure and social spaces. When a city government invests in parks and community centers, it directly aims to enhance the daily lived experience and happiness of its residents. These improvements go beyond basic survival to address the social and psychological needs of the urban.

47. (A) The analysis of rock formations and landforms.
Political geography focuses on the spatial aspects of political processes, such as state sovereignty, globalization, and the role of non-state actors. It examines how these factors influence boundaries and the distribution of resources on a global scale. While physical features like landforms can influence political decisions, the detailed study of rock formations belongs to the field of geomorphology rather than.

48. (B) Social Structure and Processes
The study of the caste system in India reveals how social hierarchies influence the physical organization of settlements and the nature of human interactions. These enduring patterns are central to the concept of social structure, while the interactions themselves represent social processes like cooperation or exclusion. Analyzing these elements helps geographers understand how traditional social systems continue to shape the cultural.

49. (A) Both A and R are true and R is the correct explanation of A.
Electoral reforms are an ongoing necessity in India to ensure that the democratic process remains free and fair. Issues such as the use of illegal money and voter intimidation require constant policy updates and technological interventions like Electronic Voting Machines. By addressing these challenges, the government seeks to maintain the integrity of elections and ensure that the results accurately reflect the.

50. (A) The region is devoid of natural resources, making it strategically unimportant.
The Indian Ocean is strategically vital because it contains critical sea lanes for global trade and is rich in natural resources, including fisheries and minerals. It features key chokepoints like the Strait of Malacca, which are essential for international maritime security. The geopolitical dynamics of this region involve the interests of major global powers and littoral states in maintaining.

51. (C) The study of Disease Ecology
Disease ecology examines the relationship between environmental factors and the seasonal or spatial distribution of illnesses. The recurring patterns of diseases like dengue during the monsoon illustrate how climate and weather conditions facilitate the spread of infections. By studying these links, geographers can predict outbreaks and help plan public health interventions that address the environmental drivers of human.

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the use of specific implements in agriculture is tied to seasonal festivals and social structures.

17. (B) 3, 1, 4, 2
Geopolitical theories have evolved over time to reflect changing global priorities and strategic concerns. The Heartland Theory was proposed first in the early twentieth century, followed by the Rimland Theory during the mid-forties. Later, focus shifted toward the neopolitics of natural resources, and most recently, the geopolitics of climate change emerged as a critical field of study addressing the contemporary environmental crisis and conflict.

18. (A) Sino-Tibetan languages - Gujarat and Rajasthan
The linguistic landscape of India is categorized into major language families with distinct spatial distributions. Sino-Tibetan languages are predominantly spoken in the northeastern states and the Himalayan regions, rather than the western states of Gujarat and Rajasthan. Conversely, Indo-Aryan languages dominate the northern and central plains, while Dravidian languages are found in the south, reflecting the complex historical migration and settlement.

19. (C) Disease Ecology
Disease ecology analyzes the relationship between human health and the environment to understand the spatial patterns of illness outbreaks. By mapping how poor sanitation and contaminated water contribute to disease clusters in specific neighborhoods, researchers can identify environmental risk factors. This field highlights the importance of environmental management and infrastructure in preventing the spread of infections and improving the overall health of populations.

20. (D) The study of the spatial expression of political power division between national and sub-national governments.
The geography of federalism focuses on the territorial organization of political authority in states that divide power between central and regional units. It examines how this division affects governance, resource distribution, and regional identities within a single national framework. This study is essential for understanding the spatial challenges of maintaining national unity while accommodating local diversity and managing the competing demands of various.

21. (A) 1, 2 and 3 only
Cultural and social geography focuses on the human aspects of spatial relationships, including the study of culture, social well-being, and the distribution of groups. It examines how identity factors like tribe, caste, and religion shape the human landscape and influence quality of life. While geopolitics and global theories are important, they belong to the specialized field of political geography rather than cultural.

22. (B) A thin, imaginary line that marks the limit of a state's sovereign territory.
In political geography, a boundary is defined as a precise line that demarcates the extent of a state's jurisdiction and sovereignty. Unlike frontiers, which are broad zones of transition, boundaries are legally recognized limits that separate one political entity from another. These lines are critical for maintaining territorial integrity and managing international relations, as they define the spatial reach of laws.

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23. (D) Health care policies in India aim to improve accessibility, affordability, and quality of health services for its population.
Health care planning in India involves a comprehensive effort by the government to ensure that all citizens have access to essential medical services. Policies are designed to address regional disparities, manage infectious diseases, and provide affordable treatments through various public health initiatives. By focusing on infrastructure and workforce development, these national strategies aim to improve the overall nutritional status and well-being of the.

24. (A) Social Exclusion
Providing infrastructure like ramps and elevators is a deliberate effort to reduce social exclusion by ensuring that physically challenged individuals can fully participate in society. These actions remove physical barriers that otherwise prevent people from accessing public spaces, transportation, and services. By promoting accessibility, the city government facilitates the inclusion of marginalized groups, thereby improving their social belonging and overall quality of life.

territorial disputes and international tensions among northern nations. This phenomenon demonstrates how physical changes in the Earth's climate can directly alter political boundaries and.

61. (C) 1, 2, 3 and 4
Electoral behavior in India is a complex phenomenon shaped by primordial loyalties like caste and religion, as well as modern issues like government performance and economic conditions. Leadership charisma and party affiliations also play a major role in influencing voter choices across the country. Understanding these diverse determinants is essential for geographers to analyze the spatial patterns of voting and.

62. (B) Subjective factors like personal freedom, security, and environmental quality.
While standard of living focuses on economic metrics like income and material wealth, quality of life includes a broader range of factors that influence human well-being. This includes subjective elements such as personal safety, freedom of choice, and the health of the natural environment. Assessing quality of life allows for a more holistic understanding of the human condition beyond.

63. (C) To achieve universal health coverage and improve public health infrastructure.
India's health care policies are primarily focused on ensuring that every citizen has access to quality medical services through universal health coverage. These initiatives aim to strengthen public health infrastructure, particularly in rural and underserved areas, and provide affordable treatments for the population. By addressing nutritional status and disease management, these national plans strive to improve the overall.

64. (C) Statement I is false, but Statement II is true.
The tribal population in India is not primarily urban; instead, it is highly concentrated in hilly, forested, and rural regions. Central India is one of the major areas with a significant concentration of various tribal groups, reflecting their historical relationship with the land and environment. Understanding this spatial distribution is essential for social geography and for planning development.

65. (A) P-3, Q-4, R-1, S-2
Different geographical concepts address various social and political issues. Social exclusion describes communities being denied services, while cultural ecology focuses on human adaptation to environments like arid lands. The geopolitics of climate change examines conflicts over resources like water, and medical tourism involves international travel for healthcare. Together, these examples illustrate the wide range of topics studied within human.

66. (B) Geography of Federalism
The geography of federalism examines how states with multiple tiers of government manage regional identities and demands for local autonomy. It analyzes the spatial aspects of power sharing and the territorial organization of political units within a national framework. This study is crucial for understanding how federal systems like India or Canada balance national unity with the unique.

67. (B) The process of urbanization and social mobility
A social process refers to the dynamic interactions and activities that occur within a society, such as urbanization and social mobility. These processes involve the movement of people and the changing nature of social relationships over time. Unlike physical or chemical cycles, social processes are driven by human behavior and lead to significant shifts in the social structure and.

68. (B) Achieve world dominance.
The Heartland Theory suggests that the region in the interior of Eurasia is the most strategic location on Earth. Mackinder argued that whichever state could control this pivot area would have the resources and defensive position to dominate the entire World-Island and eventually the globe. This land-based perspective emphasized the shift away from maritime power as the primary.

69. (A) Both A and R are true and R is the correct explanation of A.
The concept of a cultural region is a fundamental tool in cultural geography for analyzing the spatial distribution of shared human traits. It allows geographers to group areas based on common characteristics like language or religion, helping them understand how culture

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ANSWERS

1. (B) The specialized behavioral patterns, understandings, and adaptations that summarize the way of life of a group of people.
Culture represents the comprehensive collection of learned behaviors, traditions, and mental frameworks shared by members of a specific social group. It encompasses the unique ways people interact with their environment and each other, incorporating language, religion, and daily customs. In geography, this concept identifies how these specialized patterns create distinct lifestyles and social identities that define human presence across various spatial regions over time.

2. (A) Social well-being is a composite measure of the quality of life, including factors like health, education, and social belonging.
Social well-being serves as a multifaceted indicator used to evaluate the overall quality of human life within a specific region. It integrates diverse objective factors such as healthcare access, educational opportunities, and housing standards along with subjective elements like social belonging and personal safety. Unlike purely economic metrics, this comprehensive approach focuses on human development and the fulfillment of basic needs within a society.

3. (C) Halford J. Mackinder
Halford J. Mackinder introduced the Heartland Theory in 1904, identifying a pivot area in the interior of Eurasia as the key to global dominance. He argued that this region was inaccessible to sea power but could be controlled through land transport like railways. His famous dictum suggested that whoever ruled Eastern Europe would command the Heartland and eventually the entire World-Island as a whole.

4. (C) Statement I is true, but Statement II is false.
Disease ecology explores how human health is influenced by the complex interplay between population behavior and environmental conditions. This field of study recognizes that the distribution and causation of illnesses are deeply connected to social practices, cultural traditions, and community habits. Environmental factors alone do not determine health outcomes; rather, it is the interaction with human cultural and social systems that shapes disease patterns.

5. (A) P-3, Q-4, R-2, S-1
Regional organizations are established to facilitate cooperation among states with shared geographical or economic interests. The European Union functions as a political and economic union for European nations, while OPEC focuses on stabilizing oil markets. In Asia, SAARC promotes progress within South Asia, and ASEAN accelerates growth in Southeast Asia. These entities demonstrate how spatial proximity and resource management drive international collaboration and regional development.

6. (B) Cultural Ecology
The investigation into how human societies adapt to their specific natural environments through specialized techniques and choices is the essence of cultural ecology. By examining how farming communities develop irrigation and crop systems in semi-arid regions, geographers understand the functional relationship between culture and nature. This approach highlights how physical constraints drive the development of adaptive cultural traits that ensure survival and environmental sustainability.

7. (D) Universal longitude of the polling booth
Electoral behavior in India is influenced by a variety of socio-economic and political factors that shape voter decisions. Internal dynamics like caste identities, religious affiliations, and the development work of various parties play significant roles in determining poll outcomes. However, the physical geographical coordinates of a polling location, such as its longitude, have no impact on the choices made by the voting population.

8. (A) The patterned social arrangements in society that emerge from and determine the actions of individuals.
Social structure refers to the stable and enduring patterns of social relationships and institutions

NODIA

or sport, work together to define a particular aspect of a society's lifestyle. Understanding these complexes helps geographers analyze the internal structure of cultures and how they differ.

79. (C) Boundaries and Frontiers
Boundaries and frontiers are the primary geographic concepts used to study the limits of state territory and the influence of physical barriers. Geographers analyze how mountains, deserts, and rivers have historically served as natural dividers or zones of transition between political entities. These physical features often shape the demarcation of legal boundaries and influence the strategic and cultural relationships between.

80. (A) The seasonal distributional pattern of nutritional status.
Subsidized food grain policies in drought-prone regions address the seasonal variations in food availability that impact nutritional status. By providing resources during specific times of the year, the government mitigates the risk of malnutrition caused by environmental cycles. This approach recognizes that health outcomes are often tied to the agricultural calendar and the environmental constraints of a particular geographic region.

81. (C) The chemical composition of basaltic rocks.
Political geography is concerned with themes like national identity, international movements, and the impact of geography on conflict and security. It examines how global trends like the internet and terrorism affect state sovereignty and territorial relationships. In contrast, the detailed study of rock chemistry is a topic within physical geography or geology and has little relevance to the analysis of.

82. (A) 1, 2 and 3 only
Cultural and social geography focuses on themes such as social structure, well-being, and the spatial distribution of various human groups like tribes and castes. It explores how these social identities are organized across the landscape and how they influence the quality of life. While geopolitics and electoral behavior are important geographic topics, they belong to the specialized sub-discipline of political.

83. (A) The creation of states like Jharkhand and Telangana.
The geography of federalism analyzes the territorial organization of political power and the management of regional identities. The creation of new states in India, such as Jharkhand and Telangana, is a prime example of how spatial and cultural demands for autonomy are addressed within a federal framework. This study explores the reasons for redrawing political boundaries to better reflect the.

84. (C) Political Geography
The study of international boundaries, such as the Durand Line, is a core topic in political geography. This field examines how these lines are demarcated, the history of their formation, and the impact they have on international relations and local populations. Boundaries are essential for defining state sovereignty and territorial integrity, making them a central focus for understanding the global.

85. (C) Statement I is true, but Statement II is false.
The European Union is a prominent regional organization that facilitates economic and political cooperation among its member states in Europe. Its goals include creating a single market and coordinating various policies, rather than managing global oil prices, which is the primary focus of OPEC. The EU demonstrates how states can pool sovereignty to achieve common regional progress and stability in.

86. (B) P-3, Q-4, R-1, S-2
Geographical concepts are often associated with key scholars and specific ideas. Cultural ecology was pioneered by Julian Steward, while social exclusion refers to the marginalization of groups. Nicholas Spykman is the proponent of the Rimland Theory, and medical tourism involves traveling specifically for healthcare services. These connections help define the various sub-disciplines of geography and provide a framework for.

87. (D) The study of the relationship between disease patterns and environmental factors.
Disease ecology investigates how health outcomes are influenced by the complex interaction between populations and their environment. It examines how factors like climate, water quality,

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ASEAN is a regional organization whose member states are located in the strategic maritime area between the Indian and Pacific Oceans. This geographical position makes the region vital for international trade and maritime security. The organization aims to foster cooperation and progress among Southeast Asian nations, reflecting the importance of spatial proximity and shared interests in regional political and.

124. (C) Statement I is false, but Statement II is true.
Social well-being and quality of life are related but distinct concepts, with quality of life being the broader of the two. While social well-being focuses on basic human needs and social belonging, quality of life includes additional dimensions like environmental health and personal freedoms. Understanding this distinction is essential for geographers to accurately assess the development and human.

125. (C) P-3, Q-4, R-1, S-2
Political geography concepts are applied to specific issues like climate change negotiations, center-state relations in federalism, and the introduction of electoral technology. Additionally, the geopolitics of the Indian Ocean focuses on maritime security and control of sea lanes. These applications show how theoretical frameworks are used to analyze contemporary political challenges and the spatial organization of power at.

126. (A) Cultural Ecology
Cultural ecology examines how human societies interact with and modify their natural landscapes through specific cultural practices and technologies. This field explores how cultures adapt to environmental constraints and how they, in turn, shape the land to meet their needs. By studying these interactions, geographers can understand the functional relationship between culture and environment and the development of.

127. (B) The caste affiliation of a candidate
Caste affiliation is a prominent determinant of electoral behavior in India, often influencing how voters choose their representatives. This social identity plays a significant role in political mobilization and the spatial patterns of party support during elections. Analyzing these factors is a core task of electoral geography, as it reveals the complex social forces that shape the democratic.

128. (B) The core of the Eurasian landmass
Mackinder's Heartland refers to the vast, resource-rich interior of the Eurasian landmass, which he identified as the most strategic location for global power. This region was largely inaccessible to sea power but could be controlled through land transport. The theory highlights the importance of the Eurasian core in geopolitical thought and its potential role as a pivot for world.

129. (A) Both A and R are true and R is the correct explanation of A.
Social exclusion leads to significant negative impacts on the health and well-being of individuals and groups by denying them access to essential resources. Lack of education, healthcare, and economic opportunities results in poverty and chronic stress, which are major drivers of poor health outcomes. This relationship demonstrates how social inequality has physical and spatial consequences for the human.

130. (C) The political stability of the Roman Empire.
The geopolitics of climate change focuses on the contemporary and future political consequences of environmental shifts, such as resource conflicts and migration. It examines how melting Arctic ice and water scarcity affect international relations today. While historical climates are studied in other fields, the stability of ancient empires like Rome is not a primary concern of this modern geopolitical.

131. (A) Study of the causes and origins of a disease.
Etiological conditions refer to the specific causes and origins of health problems and diseases. In medical geography, this involves analyzing how environmental, biological, and social factors lead to the development of illnesses in a population. By identifying these causes, researchers can better understand the spatial patterns of disease and help design more effective health policies and interventions to improve.

132. (A) The spatial distribution of language groups influencing political boundaries.
The linguistic reorganization of Indian states is a clear application of how the spatial distribution

NODIA

beliefs and dietary habits impact human health. This study examines how social identity and community practices influence nutritional status and the prevalence of specific diseases. By analyzing these links, geographers can better understand the human condition and develop health interventions that are sensitive to.

97. (B) Social Process
A social process refers to the dynamic and ongoing interactions between individuals and groups that establish and maintain social relations. These processes include cooperation, competition, and assimilation, which shape the structure of society over time. Understanding these dynamics is essential for geographers as it explains how social groups evolve and how their interactions influence the organization of human activities.

98. (C) Statement I is true, but Statement II is false.
The geopolitics of climate change explores how environmental shifts can lead to international conflicts over increasingly scarce resources like water. However, the physical impacts of climate change, such as sea-level rise, will not be uniform across the globe; some regions will face much more severe consequences than others. This geographical variation in impact is a key factor in.

99. (B) Zone or area of transition
In political geography, a frontier is conceptualized as a broad zone of transition rather than a precise line. It represents an area where the authority of a state is not yet fully established or where different cultures meet and interact. Historically, these zones preceded the demarcated boundaries of modern states and often had a unique economic and social character that.

100. (B) 2, 1, 4, 3
Addressing public health challenges involves a logical sequence starting with the identification of a problem, followed by the formulation of policies. These policies are then implemented through specific health programs, eventually leading to measurable improvements in social well-being indicators. This process illustrates how government action and planning are essential for enhancing the quality of life and health outcomes for.

101. (B) Cultural Ecology
Cultural ecology focuses on the functional relationship between human societies and their natural environment, viewing culture as a primary system of adaptation. It examines how groups develop specific practices and tools to survive and thrive in particular environmental settings. This perspective highlights the role of physical constraints and resources in shaping cultural traits and social organization, emphasizing the dynamic interaction.

102. (A) A study of the impact of monsoon patterns on the spread of malaria in Odisha.
A study linking monsoon patterns to the spread of malaria is a perfect example of disease ecology, as it examines the relationship between environmental factors and health outcomes. Geographers analyze how weather and climate facilitate the spread of infections, helping to identify risk zones and plan public health interventions. This approach is essential for understanding the spatial patterns of.

103. (B) Promote economic growth, social progress, and cultural development in the South Asian region.
SAARC is a regional organization established to foster cooperation and development among the nations of South Asia. Its primary purpose is to enhance economic growth and social progress through shared initiatives and dialogue. By addressing common challenges and promoting cultural exchange, the organization aims to improve the quality of life for the people in the region and maintain regional stability.

104. (A) 1, 2 and 3 only
Political geography focuses on themes such as geopolitical theories, federalism, and the political implications of climate change. These topics explore the spatial organization of power and the strategic relationships between states. While social well-being and disease ecology are important geographic fields, they belong to the sub-disciplines of social and medical geography, respectively, rather than the core study of.

105. (A) P-1, Q-3, R-4, S-2
Cultural geography utilizes a hierarchical set of terms to describe the organization of culture across space. A trait is the smallest unit of behavior,

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141. (A) 1, 2, 3 and 4 only
The geopolitics of world resources involves the global competition for strategic materials, the importance of maritime chokepoints, and the influence of resource-producing organizations. These factors illustrate how the uneven distribution of resources shapes international relations and foreign policy. While local farming patterns are important in other areas of geography, they do not typically fall under the broad geopolitical.

142. (B) A geographical unit based on characteristics and functions of culture.
A cultural region is a geographical unit where the population shares distinctive cultural characteristics, such as language or religion. This concept helps geographers analyze how culture is organized across the landscape and how it functions to create a unique sense of place. By mapping these regions, scholars can better understand the spatial distribution of human lifestyles and the historical.

143. (C) Geopolitics of World Resources
OPEC is a critical organization in the study of the geopolitics of world resources because it coordinates the petroleum policies of major oil-exporting nations. Its actions influence global energy markets and the strategic relationships between producer and consumer countries. As an association of nations controlling a vital resource, it plays a key role in shaping international power dynamics and.

144. (C) Statement I is false, but Statement II is true.
In political geography, a boundary is a precise line of separation, while a frontier is a broad zone of transition. India's international borders with neighbors like Pakistan and China are correctly identified as boundaries, as they are demarcated limits of state sovereignty. Understanding this distinction is essential for analyzing territorial integrity and the legal and political relationship between neighboring states.

145. (A) P-3, Q-1, R-2, S-4
The linguistic landscape of India shows a distinct regional distribution of major language families. Tamil Nadu is dominated by the Dravidian family, while Uttar Pradesh and West Bengal are primarily Indo-Aryan speaking regions. Nagaland is characterized by Sino-Tibetan languages, reflecting the historical settlement and cultural diversity of the northeastern states. Analyzing these patterns is essential for understanding the social geography.

146. (B) Environment and Human Health
Mapping the prevalence of goiter and linking it to environmental factors like iodine-deficient soils is a core task in the study of environment and human health. This field examines the spatial relationship between physical surroundings and health outcomes, helping to identify risk zones and plan medical interventions. By understanding these environmental links, geographers can contribute to improving the.

147. (C) A community being denied access to clean drinking water because of their caste.
Social exclusion is best illustrated by the systematic denial of basic resources, like clean water, to specific communities based on their identity. This process marginalizes certain groups and prevents them from participating fully in society or achieving a good quality of life. Analyzing such patterns helps geographers identify regions of deprivation and understand the social forces that drive spatial.

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148. (A) Neopolitics of World Natural Resources
Territorial disputes over offshore oil reserves are a primary focus of the neopolitics of world natural resources. This field examines how the discovery and control of strategic materials drive international competition and shape foreign policy. In a globalized world, the uneven distribution of these resources leads to new strategic alliances and potential conflicts between nations seeking to secure their.

149. (C) A is true but R is false.
The determinants of electoral behavior in India are indeed complex and multi-faceted, involving many factors beyond a candidate's personal wealth. Voters are influenced by social identities like caste and religion, as well as the performance of the government on economic and development issues. While money can play a role, it is not the single determining factor in the diverse democratic.

150. (D) Uralic

Social structure refers to the organized framework of relationships and institutions, such as family and caste, that shape a society. This stable system of social arrangements guides human behavior and influences the distribution of resources and power within a community. Understanding social structure is fundamental for geographers as it provides context for the spatial patterns of human activity and.

115. (C) Amphibian character, having access to both land and sea power.
Spykman's Rimland is characterized by its "amphibian" nature, as it occupies the coastal regions of Eurasia with access to both land-based and maritime power. This strategic duality makes the Rimland the most vital area for world control, according to his theory. The ability to influence both the interior landmass and the global oceans gives the Rimland states immense.

116. (C) Statement I is false, but Statement II is true.
The religious landscape of India is not uniform; instead, it shows significant regional variations in the concentration of different communities. Certain states and areas are known for high populations of specific religious groups, reflecting historical settlement patterns and cultural identities. This spatial variation is a key topic in the social geography of India and influences local traditions and social.

117. (B) Nutritional Status
Health policies aimed at addressing conditions like iron-deficiency anemia are directly concerned with improving the nutritional status of the population. These initiatives focus on the intake and utilization of essential nutrients to enhance health outcomes and reduce the prevalence of deficiency diseases. Understanding the spatial patterns of such conditions helps health geographers plan targeted interventions and improve the.

118. (B) EU - North American Union
The European Union is an organization of European countries, whereas the North American region has different cooperative agreements like USMCA. SAARC and ASEAN are correctly identified with their respective Asian regions, and OPEC represents petroleum-exporting nations. Identifying these regional organizations and their correct geographical focus is essential for understanding the spatial organization of international cooperation and global economic.

119. (A) Social Exclusion
Denying a particular ethnic group access to housing is a clear manifestation of social exclusion, where individuals are systematically blocked from resources based on their identity. This process creates segregated residential patterns and reinforces social inequalities within urban areas. Analyzing these patterns of exclusion is a key task for social geographers, as it reveals the spatial consequences of.

120. (B) Geopolitics of the Indian Ocean and World Resources
The strategic importance of maritime chokepoints like the Strait of Hormuz is a central theme in the geopolitics of the Indian Ocean and world resources. These narrow passages are vital for the global transportation of oil and other strategic materials, making them areas of intense international interest and potential conflict. Control over these sea lanes influences global energy.

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121. (A) 1, 2 and 4 only
In India, social identities like caste and religion have distinct spatial patterns and significantly influence residential layouts and local culture. Language has also been a primary factor in the territorial organization of states, reflecting its importance in the federal system. However, tribal populations are not predominantly urban and social groups are not evenly distributed, as regional concentrations are.

122. (B) A portion of the earth's surface occupied by people sharing recognizable and distinctive cultural characteristics.
A cultural area is a geographical unit where the population shares common cultural traits, such as language, religion, or lifestyle. This concept allows geographers to map the spatial extent of human cultures and analyze how they interact with their environment. By identifying these areas, scholars can better understand the diversity of human societies and the historical and social.

123. (B) The lands between the Indian and Pacific Oceans

This field explores the relationship between the environment and human health to understand how illnesses spread. By managing environmental factors, geographers and health professionals can prevent outbreaks and reduce the incidence of infections, illustrating the importance of environmental health in population.

160. (A) Geography of Federalism
The geography of federalism examines the spatial organization of power and the financial relationships between central and regional governments. The sharing of resources is a core issue that influences center-state relations and the development of different territories within a federal state. Analyzing these dynamics provides insights into the challenges of maintaining national unity while addressing the diverse economic needs of.

161. (A) 1, 2 and 3 only
Cultural convergence is a process driven by globalization and media where different cultures become increasingly similar as they adopt shared traits. This phenomenon can lead to the loss of unique local traditions as global influences spread. Understanding this process is essential for geographers as it reveals how international interactions are reshaping the global cultural landscape, even as some groups resist.

162. (B) The control of the "Pivot Area" in Eurasia could lead to world power.
Mackinder's Heartland Theory argued that the interior of Eurasia, known as the "Pivot Area," was the most strategic location for global dominance. He believed that land-based power was becoming more important than sea power due to improvements in land transportation. The theory suggested that whichever state controlled this core would have the resources to achieve world power, shaping geopolitical strategy.

163. (A) Social Structure
The segregation of residential areas into separate colonies for different caste groups is a spatial manifestation of India's social structure. This enduring pattern of social hierarchy influences how villages and urban spaces are organized, reflecting the traditional rules of social interaction and residential placement. Analyzing these layouts helps geographers understand the impact of social systems on the human landscape.

164. (C) Statement I is true, but Statement II is false.
The geopolitics of world resources examines how the uneven distribution of essential materials like oil and water influences international relationships and state power. These resources are not spread evenly across the Earth, leading to strategic competition and the formation of global alliances to secure access. Understanding these spatial inequalities is vital for analyzing modern conflict and the economic stability of different.

165. (A) P-3, Q-1, R-2, S-4
The spatial distribution of language families in India reflects the country's immense cultural diversity. Tamil Nadu is a core region for Dravidian languages, while northern and eastern states like Uttar Pradesh and West Bengal are primarily Indo-Aryan. Nagaland's population predominantly speaks Sino-Tibetan languages. These patterns are essential for understanding the social geography of India and how linguistic identity is.

166. (A) The Geography of Federalism and regionalism.
The creation of new states in India is a major topic in the geography of federalism, as it reflects the management of regional identities and demands for local governance. These changes to the political map are often driven by spatial and cultural differences that seek better representation within the national framework. Analyzing these developments helps geographers understand the dynamic nature.

167. (B) The traditional folk music and dance forms of Rajasthan.
Cultural heritage includes the intangible traditions and performing arts passed down through generations, such as the folk music and dance of Rajasthan. These traits represent the unique identity and history of a community and are essential for maintaining cultural continuity. Preserving such heritage provides a vital link between the past and present, enriching the social and cultural landscape of the.

168. (B) Trends and Developments in Political Geography

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of social groups can influence the demarcation of political boundaries. This policy recognized the importance of linguistic identity in a federal system and aimed to create more culturally homogenous administrative units. It reflects the core principles of the geography of federalism, where territorial organization.

133. (A) 1, 2 and 3 only
Political geography is primarily concerned with themes like boundaries, electoral reforms, and the factors influencing voting behavior. These topics explore the organization of territory and the processes of democratic governance. While nutritional status and social well-being are important geographic subjects, they belong to the fields of medical and social geography, respectively, rather than the core study of political.

134. (D) Social Processes
Social processes represent the dynamic interactions between individuals and groups, such as interaction, competition, and assimilation, that occur within a society. these activities are responsible for the constant evolution of social relationships and the maintenance of the social structure over time. Understanding these processes is essential for geographers to explain how human societies are organized and how they change.

135. (A) "Who controls the Rimland rules Eurasia; who rules Eurasia controls the destinies of the world"
Nicholas Spykman's famous statement summarizes the core argument of the Rimland Theory, which emphasizes the strategic importance of the Eurasian coastal lands. He believed that control of the maritime fringe, with its access to both land and sea resources, was the key to global dominance. This perspective provided an alternative to Mackinder's land-based theory and influenced geopolitical strategy during.

136. (C) Statement I is false, but Statement II is true.
India's health care policies are not static; they are periodically reviewed and updated to address emerging challenges like non-communicable diseases. This dynamic approach ensures that health planning remains relevant to the changing health priorities of the population and incorporates new technologies and treatments. By evolving over time, national policies aim to improve health outcomes and adapt to the shifting needs.

137. (A) 1, 4, 2, 3
Geopolitical theories and international organizations have emerged in a specific chronological sequence. The Heartland Theory was proposed first in 1904, followed by the Rimland Theory in the 1940s. The European Union was formed in the latter half of the twentieth century, and the geopolitics of climate change has become a major theme more recently. This timeline reflects the changing global priorities.

138. (C) The political ideology of a neighbouring country
Quality of life is determined by factors that directly impact an individual's well-being, such as personal happiness, environmental health, and security. It is a multidimensional concept focused on the human experience within their immediate social and physical environment. While international politics can be important, the political ideology of a distant neighbor is not a primary measure of a person's individual.

139. (A) Religion as a social group
The study of the spatial clustering of the Jain community is an analysis of how religion functions as a social group with distinct geographic patterns. These concentrations reflect historical settlement, economic roles, and cultural identity across various Indian states. By mapping these groups, geographers can better understand the social structure of India and how religious identity influences the distribution of.

140. (A) The impact of inter-state river water disputes on centre-state relations.
A political geographer studying the geography of federalism would be highly interested in how inter-state resource disputes affect center-state relations. These conflicts are inherently spatial and challenge the territorial organization of power within a federal system. Analyzing how these issues are managed provides insights into the stability of the state and the complex dynamics of shared governance and regional.

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and sanitation impact the spread and distribution of illnesses across different geographical areas. By understanding these environmental links, geographers can identify risk zones and help develop public health strategies to prevent outbreaks and improve.

88. (B) Spatial distribution of social groups
The presence of major language families like Dravidian and Indo-Aryan is a key component of India's social geography. These linguistic groups have distinct spatial patterns that reflect historical migrations and settlement histories across the subcontinent. Analyzing the distribution of these groups helps geographers understand the cultural diversity of India and how linguistic identity is tied to specific.

89. (C) Neopolitics of world natural resources
The neopolitics of world natural resources focuses on the modern struggles between states to secure access to essential materials like rare earth minerals. These resources are critical for modern technology and drive international strategic competition and foreign policy decisions. This field examines how the uneven global distribution of resources creates power imbalances and influences the nature of global political.

90. (A) Both A and R are true and R is the correct explanation of A.
Cultural convergence is accelerating in the modern era due to the forces of globalization and advanced communication technologies. These tools allow for the rapid exchange of ideas, fashion, and food, leading to a more homogenous global culture. As barriers to interaction decrease, societies increasingly adopt shared traits, illustrating how technological progress drives the merging of diverse cultural traditions into.

91. (B) NATO
NATO is primarily a military alliance formed for collective defense rather than a regional organization focused on economic and social cooperation like SAARC, ASEAN, or the EU. While NATO has a geographical basis, its core purpose is security and military integration. Regional organizations of cooperation, on the other hand, aim to foster progress and development through shared economic and cultural.

92. (D) Tribe
The Gaddi, Santhal, and Gond are significant tribal groups in India, each with a distinct spatial distribution and cultural identity. The study of these groups is a key topic in the social geography of India, as it explores their relationship with the environment and their position within the broader social structure. Tribal identities are often anchored to specific hilly.

93. (B) The Heartland Theory
The famous dictum regarding the control of Eastern Europe and the Heartland is the central thesis of Mackinder's Heartland Theory. It highlights the strategic importance of the interior Eurasian landmass as the key to global dominance. This land-based perspective argues that whoever controls this resource-rich and defensible core would eventually have the power to command the entire world, shaping.

94. (B) How does a voter's caste and economic status influence their choice of candidate?
The study of electoral behavior focuses on the factors that influence how individuals and groups make their voting decisions. In the Indian context, social identities like caste and economic conditions are primary determinants of poll outcomes. Analyzing these relationships helps geographers understand the spatial patterns of political support and the complex social forces that drive democratic participation and candidate.

95. (C) 1, 2 and 3 only
Political geography is a vital and relevant field that examines the spatial aspects of political processes and the organization of power. It analyzes how geography influences phenomena like boundaries, federalism, and international geopolitics. Rather than being outdated, it provides essential insights into how the physical and human landscape shapes governance and conflict in the contemporary world, addressing the complex challenges of.

96. (A) Social Geography and Medical Geography
The intersection of social and medical geography explores how cultural factors like religious

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India is home to several major language families, including Indo-Aryan, Dravidian, and Sino-Tibetan, which have a significant spatial presence across the country. These families reflect the historical migrations and the complex cultural diversity of the subcontinent. However, the Uralic language family is not native to India and does not have a presence there, as it is primarily found in.

151. (B) Study of geography's role in a globalizing world, including the rise of supranationalism and localism.
Modern political geography is characterized by the study of how globalization reshapes state sovereignty and international relations. This includes analyzing the rise of supranational organizations like the European Union alongside the persistence of local identities and movements. By examining these trends, geographers can understand how the global and local levels interact to shape the modern political landscape and territory.

152. (A) Cultural Ecology
Cultural ecology investigates how human societies adapt to their natural environment by developing specific cultural traits like specialized housing styles. The use of stilt houses in flood-prone regions is a clear example of how environmental constraints influence architectural choices and lifestyle patterns. This functional relationship between culture and nature is a core theme in understanding human adaptation and.

153. (C) 1, 2 and 3 only
The study of social structure and processes examines the stable patterns of social relations and the dynamic interactions like cooperation and conflict. It focuses on how society is organized and how it evolves over time through human activity. While political boundaries are important in other fields, they are not the primary focus of this specific sub-discipline, which prioritizes the.

154. (A) Health Care Planning and Policies
The National Health Mission is a major policy initiative in India aimed at improving public health infrastructure and ensuring access to medical services. It focuses on addressing regional disparities and providing affordable healthcare to all citizens, particularly in rural and underserved areas. This program is a core component of the country's efforts to enhance health outcomes and the overall.

155. (B) Rimland Theory
The Rimland Theory posits that the coastal regions of Eurasia are the key to global power due to their access to both land and sea resources. Proponents of this theory argue that control of the maritime fringe allows for dominance over the entire World-Island. This perspective provides an alternative to the land-based Heartland Theory and highlights the strategic importance.

156. (C) Statement I is true, but Statement II is false.
Medical tourism in India is successful because it offers high-quality medical services and skilled professionals at a much lower cost than Western countries. This affordability, combined with modern facilities, is the main attraction for international patients seeking various treatments. The sector's growth is driven by the combination of clinical excellence and cost-effectiveness, contributing to the country's economy through foreign.

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157. (A) Geo-politics of India Ocean
The geopolitics of the Indian Ocean focuses on the strategic importance of maritime chokepoints, naval bases, and critical trade routes. This region is vital for international security and global commerce, leading to competition for influence among global and regional powers. Analyzing these dynamics helps geographers understand how control over sea lanes affects state power and international stability in.

158. (D) Caste - European
In the Indian context, social groups are categorized into tribes like the Santhal, language families like the Dravidian, and religions like Islam. These groups have distinct spatial patterns and cultural identities. However, "European" is not a caste within the Indian social system; rather, it refers to a geographic or ethnic origin outside the traditional caste structure of the subcontinent.

159. (A) Disease Ecology
Public health interventions like improving sanitation and controlling vector populations are based on the principles of disease ecology.

which combines into a complex of interrelated practices. These define a cultural region, and the largest, most uniform area is known as a cultural realm. This framework allows for the systematic analysis of human lifestyles at.

106. (B) Electoral Geography
Electoral geography is the sub-discipline of political geography that focuses on the analysis of voting patterns and the factors that influence them. It examines how voter preferences vary across space and how social and economic conditions shape poll outcomes. By studying these spatial trends, geographers can provide insights into the democratic process and the diverse political landscape of a country.

107. (B) It focuses on the renewed and evolving geopolitical struggles over the access and control of essential resources like water, energy, and minerals.
The neopolitics of world natural resources examines the modern political dynamics driven by the need for strategic materials in a globalized world. It highlights how the uneven distribution of resources like oil and water leads to international competition and new strategic alliances. This field is essential for understanding contemporary conflict and the ways in which states manage resource scarcity.

108. (C) Factors like health, education, social security, and personal safety.
Social well-being is a comprehensive concept that measures the quality of human life beyond simple economic indicators. It includes essential factors such as access to healthcare, education, and social security, as well as the sense of personal safety. Assessing these elements provides a more holistic view of development and the human condition, helping geographers identify areas of progress or.

109. (A) Both A and R are true and R is the correct explanation of A.
India's federal structure is deeply rooted in geography, as the creation of many states was based on linguistic and cultural differences. This spatial organization of power is a key aspect of the geography of federalism, showing how territorial units are used to manage national diversity. The distinct political-geographical map of India reflects the government's efforts to balance central.

110. (C) The determination of international maritime boundaries.
Health care planning and policies in India are focused on internal issues like the distribution of medical facilities, immunization programs, and drug regulation. These initiatives aim to improve the health outcomes of the population and ensure access to essential services. While international boundaries are critical in political geography, they are not a direct concern for national health planners, who focus.

111. (A) Environment and Human Health
The concentration of diseases in specific geographical areas, such as goitre in regions with iodine-deficient soils, illustrates the direct link between the environment and human health. Geographers study these spatial patterns to understand how physical factors influence health outcomes and to plan targeted medical interventions. This field highlights the importance of environmental management in addressing health disparities and.

112. (B) Cultural Heritage
Cultural heritage comprises the tangible artifacts and intangible traditions inherited from past generations that define a community's identity. This includes everything from historical monuments and traditional arts to folklore and oral histories. Preserving these elements is essential for maintaining a connection to the past and ensuring the continuity of cultural identities in a rapidly changing and globalizing world as.

113. (C) 1, 2 and 3 only
The geopolitics of climate change investigates how physical environmental shifts alter political relationships and lead to potential conflicts over resources. It also examines the international negotiations and power dynamics involved in creating global climate treaties. While historical fluctuations are interesting, the primary focus is on the contemporary and future political consequences of a warming planet and the strategic challenges.

114. (A) Social Structure

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The concept of a 'clash of civilizations' is a macro-level theme within modern political geography that examines potential conflicts between broad cultural and religious groups. This perspective analyzes how deep-seated identities can drive international tensions and reshape global alliances in a globalizing world. It reflects the field's focus on how cultural and spatial factors influence state power and international security.

169. (A) Both A and R are true and R is the correct explanation of A.
The European Union is a prominent example of regional cooperation, where member states coordinate their economic and political activities for mutual benefit. By creating a single market and a common currency, the EU has enhanced the economic power and stability of its members. This development illustrates how geographical proximity and shared interests can drive states to pool sovereignty and achieve.

170. (B) The role of India in SAARC.
The study of nutritional status in India focuses on identifying deficiencies, analyzing spatial patterns of malnutrition, and understanding how seasonal factors impact food availability. These topics are central to health and social geography. While India's role in SAARC is an important geopolitical subject, it does not directly relate to the physiological and etiological study of human nutrition and health outcomes.

171. (C) The eastern and central tribal belts.
The Austro-Asiatic language family, including languages like Santhali and Mundari, is predominantly found in the eastern and central tribal regions of India. This spatial distribution reflects the historical settlement of these groups and their long-standing connection to these specific geographical areas. Analyzing where these languages are spoken helps geographers understand the linguistic diversity and social organization of India's tribal.

172. (A) Geopolitics
Geopolitics is the study of how a country's geographical position, natural resources, and spatial relationships influence its political power and foreign policy. It examines how states strategically use their territory to achieve national goals and manage international relations. This field is essential for understanding global conflict, strategic alliances, and the ways in which geography shapes the competitive dynamics of international.

173. (B) 1, 2 and 3 only
Medical geography in the Indian context includes the analysis of seasonal disease patterns, the implementation of health care policies, and the study of nutritional status. These topics examine the relationship between the environment, public health, and human well-being. While electoral behavior is an important field in geography, it belongs to the sub-discipline of political geography rather than the study of.

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174. (C) Zone
The primary distinction between a boundary and a frontier is their physical and conceptual nature. A boundary is a precisely demarcated line that marks the limit of state sovereignty, while a frontier is a broad zone or area of transition. Historically, frontiers served as buffers between political entities before the development of fixed legal lines, often possessing a unique cultural and.

175. (A) Electoral Reform
The implementation of the Model Code of Conduct is a significant electoral reform in India designed to ensure a free and fair democratic process. It provides a set of guidelines for political parties and candidates during elections, promoting transparency and preventing the misuse of official power. These measures are essential for maintaining the integrity of the democratic system and ensuring.

176. (C) Statement I is false, but Statement II is true.
Cultural ecology focuses on the interaction between human culture and the natural environment, rather than viewing culture as independent of nature. This field examines how societies adapt their practices and tools to environmental constraints and how they, in turn, modify the landscape. Understanding this relationship is vital for analyzing human survival and the development of unique cultural traits across different geographical.

177. (A) 3, 2, 4, 1

passages are vital for international trade and maritime security, making them areas of intense strategic interest for both regional and global powers. Control over these sea lanes influences global energy transportation and the security of international commerce in a.

213. (C) 1, 2 and 3 only
The geopolitics of world resources involves the study of international conflicts over shared river basins, competition for deep-sea mineral rights, and the influence of oil-producing nations. These issues illustrate how the uneven distribution of essential materials shapes global power dynamics and foreign policy. While ancient structures are of historical interest, they do not typically fall under the broad geopolitical study.

214. (B) A multidimensional concept including wealth, health, environment, and social belonging.
Quality of life is a comprehensive and multidimensional concept that measures human well-being through a range of factors beyond simple economic wealth. It includes health outcomes, environmental quality, and the sense of social belonging and personal security. Assessing these diverse elements provides a more holistic understanding of development and the human condition, allowing geographers to identify areas of progress and.

215. (A) Geography of Federalism
The establishment of Special Economic Zones with distinct regulations is an issue that can be analyzed within the geography of federalism. These zones represent a spatial variation in governance and economic policy that can influence the relationships between central and regional authorities. Analyzing such developments provides insights into how federal systems manage territorial diversity and the diverse economic needs of.

216. (C) Statement I is false, but Statement II is true.
A cultural region is not defined by a single trait but rather by a set of cultural characteristics that are more prevalent within that area than outside it. This concept allows geographers to map the spatial extent of human cultures and analyze how they interact with their surroundings. By identifying these regions, scholars can better understand the diversity of human societies.

217. (C) Christian
The states of Nagaland, Mizoram, and Meghalaya in northeastern India are characterized by a high concentration of the Christian religious group. This distinct spatial pattern reflects the historical influence of missionary activities and the unique cultural evolution of the region. Understanding the distribution of religious communities is a key task in the social geography of India, as it influences local.

218. (C) The Association of Southeast Asian Nations (ASEAN)
ASEAN is a prominent regional organization focused on promoting economic, social, and cultural cooperation among its member states in Southeast Asia. Unlike broad international bodies like the UN or IMF, regional organizations of cooperation are based on geographical proximity and shared interests within a specific region. These entities facilitate regional stability and progress through collective action and policy coordination across various sectors.

219. (A) Neopolitics of World Natural Resources
Political fallout from the construction of dams on shared rivers is a prime example of the neopolitics of world natural resources. This field examines how the control and distribution of vital resources like water drive international tensions and strategic decisions in the contemporary world. As water becomes increasingly scarce, its management becomes a major factor in international relations and the security.

220. (A) Social Exclusion
Social exclusion refers to the process by which individuals or groups are marginalized and denied full participation in society, leading to feelings of being left out. This systematic denial of access to resources and opportunities based on identity creates barriers to well-being and social belonging. Analyzing these patterns is essential for geographers as it reveals the spatial consequences of inequality.

221. (B) 1, 2, 3 and 4 only
Political geography focuses on themes such as international boundaries, geopolitical theories like Heartland and Rimland, and the geography of federalism. It also includes the contemporary geopolitics of climate change, which addresses

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186. (B) Cultural Diffusion, a process related to Cultural Convergence
The global spread of yoga and Indian cuisine is a prominent example of cultural diffusion, where traits from one society are adopted by others. This process is a major driver of cultural convergence, leading to a more integrated and shared global cultural landscape. Driven by globalization and communication, the exchange of cultural practices illustrates how societies increasingly interact and influence.

187. (A) Land power, particularly railways, making the Eurasian core accessible.
Halford Mackinder's Heartland Theory was largely driven by the development of land transportation, particularly railways, which he believed would make the Eurasian interior more accessible and strategic. This shift challenged the traditional dominance of sea power and highlighted the potential for a land-based state to achieve global dominance from the Heartland. His perspective reshaped geopolitical thought by emphasizing the.

188. (B) The segregation of residential areas based on caste or income in a city.
The segregation of residential neighborhoods based on caste or income is a clear example of how social structure influences the spatial organization of urban spaces. These patterns reflect enduring social hierarchies and rules of interaction that shape where people live and how they use the city. Analyzing these layouts helps geographers understand the impact of social systems on the human.

189. (A) Both A and R are true and R is the correct explanation of A.
The complex issues along the India-Bangladesh border, such as enclaves and migration, are the result of a boundary demarcation that cut across a culturally homogenous landscape. The haste of the partition led to territorial anomalies that continue to influence international relations and local life. This situation illustrates the challenges of defining political boundaries in densely populated regions with shared historical and.

190. (D) Formulating the country's foreign policy.
Health care planning in India focuses on domestic issues like infrastructure, medicine supply, and medical workforce development to improve public health outcomes. These policies aim to ensure that all citizens have access to essential medical services within the national borders. While health can influence international relations, the formulation of a country's broad foreign policy is not a primary task for.

191. (B) How political power and international relations are being shaped by the consequences of a changing climate.
The geopolitics of climate change examines how the physical impacts of environmental shifts, such as resource scarcity and sea-level rise, influence global power dynamics. It analyzes the potential for international conflict and the new strategic challenges faced by states in a warming world. This field is essential for understanding how climate change is reshaping political boundaries and the strategic interests of.

192. (A) Social Well-being and Quality of Life
A low score on the Human Development Index indicates a lack of progress in areas like health, education, and standard of living, which are core components of social well-being and quality of life. This composite measure helps geographers assess the human condition across different regions and identify areas in need of development. Improving these indicators is a primary goal.

193. (B) 1, 2 and 3 only
Modern political geography is characterized by the study of power at various scales, the inclusion of diverse perspectives like feminist and post-colonial views, and the analysis of new spaces like the internet. These developments reflect the field's adaptation to a complex and globalizing world. Rather than becoming irrelevant, geography continues to provide essential insights into the spatial organization of power.

194. (A) Social Geography and Medical Geography
The study of how dietary laws based on religious beliefs affect nutritional health represents the intersection of social and medical geography. This interdisciplinary approach examines how cultural identity and community practices influence health outcomes and the spatial distribution of nutritional status. By analyzing these links, geographers can better understand

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the human condition and help design health interventions that are sensitive.

195. (C) The manner in which people vote and the factors influencing their voting decisions.
Electoral behavior refers to the study of how and why voters make their choices during elections, including the influence of social, economic, and political factors. Analyzing these patterns is a core task of electoral geography, as it reveals the spatial variations in political support and the complex forces that drive democratic participation. Understanding voter decisions is essential for explaining poll.

196. (C) Statement I is false, but Statement II is true.
Cultural heritage is a broad concept that includes both tangible artifacts like monuments and intangible elements such as traditions, performing arts, and oral histories. Both aspects are essential for representing a community's identity and maintaining a connection to the past. Preserving this multifaceted heritage ensures the continuity of diverse cultural expressions in a globalizing world and provides a foundation for.

197. (B) Spatial distribution of social groups in India
The study of the distribution of tribal groups like the Gond and Bhil in Central India is an analysis of how social groups are organized across the landscape. These groups have distinct spatial patterns that reflect their historical relationship with the land and their unique cultural identities. Understanding these distributions is essential for social geography and for planning inclusive development.

198. (C) Coordination of petroleum policies
OPEC is a regional and international organization whose primary focus is the coordination and unification of petroleum policies among its member states. Its goal is to stabilize oil markets and ensure a fair and steady income for producer nations. As an association of major exporters, it plays a vital role in the geopolitics of world resources and influences global energy prices.

199. (A) Cultural Ecology
Cultural ecology investigates the relationship between human societies and their natural environment, such as how Himalayan communities adapt to the unique physical conditions of high altitudes. This field examines the functional relationship between culture and nature, looking at how environmental constraints shape cultural traits and social organization. Understanding these adaptations is vital for analyzing human survival and the diversity of cultural.

200. (C) Medical Tourism
Medical tourism involves individuals traveling to other countries specifically to receive medical care, often driven by lower costs or higher quality of services. This phenomenon has become a significant sector in the global health economy, with countries like India attracting many international patients for various procedures. The growth of medical tourism reflects the increasing globalization of healthcare and the strategic importance.

201. (C) 1, 2, 3 and 4 only
Social and cultural geography focuses on themes like the concept of culture, social well-being, and the spatial distribution of groups like tribes, castes, and religions. It also includes the study of disease ecology and nutritional status, which link the environment to human health. While geopolitical theories are important in geography, they belong to the field of political geography rather than.

202. (A) Concept of Culture, Areas and Region
The concept of a cultural hearth is central to understanding the origins and spatial diffusion of cultural traits, which is a core topic in the study of culture, areas, and regions. It identifies the geographical location where a culture group's distinct lifestyle first developed. Analyzing these centers of origin helps geographers trace the historical spread of cultures and the formation.

203. (B) Geo-politics of India Ocean
The competition for influence in the Indian Ocean region among global and regional powers like India and China is a major theme in modern geopolitics. This struggle involves strategic control over sea lanes, naval access, and resource management in a vital maritime corridor. Analyzing these dynamics is essential for understanding international stability and the ways in which geography shapes the competitive interests.

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204. (C) Statement I is false, but Statement II is true.
Federalism is characterized by the division of political power between central and regional governments rather than a single all-powerful authority. The geography of federalism examines the spatial aspects of this division and how it influences governance, resource allocation, and regional identities. Understanding this territorial organization of power is essential for analyzing the stability and functioning of federal states in a diverse.

205. (A) P-4, Q-3, R-2, S-1
Geopolitical and cultural theories are often associated with key scholars who developed them. Halford Mackinder proposed the Heartland Theory, while Nicholas Spykman focused on the Rimland. Friedrich Ratzel is known for the Organic State Theory, and Julian Steward pioneered the field of cultural ecology. These foundational concepts provide a framework for analyzing the spatial organization of power and human adaptation to.

206. (B) The repetitive and dynamic forms of interaction in social life, such as competition or cooperation.
A social process refers to the dynamic and ongoing interactions between individuals and groups, such as cooperation or competition, that shape society over time. These repetitive forms of interaction are responsible for the constant evolution of social relationships and the maintenance of the social structure. Understanding these dynamics is essential for geographers to explain how human societies are organized and how.

207. (A) Environment and Human Health
Policy interventions like salt fortification to combat goiter are based on an understanding of the relationship between environmental factors and human health. Geographers study the spatial distribution of nutrient deficiencies and health outcomes to identify regions in need of such programs. This field highlights the importance of addressing the environmental causes of disease to improve the overall nutritional status and well-being.

208. (A) Trends and Developments in Political Geography
The rise of supranational organizations like the European Union is a major trend in modern political geography that challenges traditional concepts of the nation-state. These bodies involve states pooling their sovereignty to achieve common economic and political goals on a regional scale. Analyzing such developments helps scholars understand how globalization is reshaping the global political landscape and the territorial organization of.

209. (A) Both A and R are true and R is the correct explanation of A.
The concentration of tribal populations in hilly and forested regions is a key aspect of India's social geography, reflecting their historical need for isolation to preserve their identity. These relatively inaccessible areas provided a refuge where tribal communities could maintain their distinct socio-cultural practices and traditional relationship with the environment. This spatial distribution illustrates the link between geography, history, and.

210. (C) The country's GDP growth rate in the 18th century
Electoral behavior in modern India is determined by current issues like development, governance, party leadership, and social identities like caste and religion. These factors directly influence how voters make their decisions during contemporary polls. Historical economic data from the eighteenth century, while interesting, does not have a primary impact on the choices made by the current voting population in a modern democratic.

211. (B) Spatial and seasonal distributional patterns
The seasonal variation in the incidence of diseases like malaria is a key aspect of their spatial and temporal distribution. Geographers study these patterns to understand how environmental factors like rainfall and temperature facilitate the spread of vector-borne illnesses. This analysis is essential for identifying high-risk times and locations, helping to plan effective public health interventions and improve the overall health.

212. (A) Geopolitics of the Indian Ocean
The strategic importance of maritime chokepoints like the Bab-el-Mandeb is a central theme in the geopolitics of the Indian Ocean. These narrow

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region and China. This line has been the subject of long-standing territorial disputes and influences international relations and strategic planning in the region. Analyzing such boundaries is a core task in political geography, as it reveals the legal and historical.

231. (B) Health, education, income, and social inclusion.
Social well-being is a multifaceted concept that measures the overall quality of human life through factors like health, education, and social inclusion. It provides a more comprehensive view of development than simple economic wealth, focusing on the fulfillment of basic human needs and social belonging. Assessing these indicators helps geographers identify areas of progress and regions in need of social and.

232. (B) Nicholas Spykman
Nicholas Spykman was the primary proponent of the Rimland Theory, which argued that the coastal regions of Eurasia were the key to global power. He believed that control of the maritime fringe allowed for dominance over the entire World-Island due to its access to both land and sea resources. His perspective provided an alternative to Mackinder's Heartland Theory and influenced strategic geopolitical.

233. (A) 1, 2 and 3 only
India's cultural heritage includes tangible monuments like the Taj Mahal, intangible arts like Bharatanatyam, and historical texts like the Vedas. These elements represent the unique identity and rich history of the subcontinent and are essential for maintaining cultural continuity. While modern factories and reforms are important, they do not fall under the traditional definition of heritage as the legacies inherited from.

234. (A) Cultural Convergence
The global spread of fast-food chains like McDonald's is a prominent example of cultural convergence, where different societies increasingly adopt shared cultural traits. This process is driven by globalization and international trade, leading to a more integrated and homogenous global cultural landscape. As international brands spread across the world, they facilitate the merging of diverse traditions and lifestyles into a.

235. (A) Health Care Planning and Policies in India
Policies focused on improving health infrastructure in rural and underserved areas are core components of health care planning in India. These initiatives aim to reduce regional disparities and ensure that all citizens have access to quality medical services, regardless of their location. By strengthening public health systems, the government seeks to improve the overall health outcomes and nutritional status of the population.

236. (C) Statement I is false, but Statement II is true.
The Indian federal system is characterized by spatial variations in power, with some states having special provisions based on their unique geographical or cultural needs. The geography of federalism examines these variations and how they influence the relationship between central and regional governments. Understanding this asymmetrical organization of power is essential for analyzing the stability and functioning of the state in a diverse.

237. (A) The spatial distribution of social groups (Religion) in India
The concentration of the Sikh population in Punjab is a key topic in the study of the spatial distribution of religious groups in India. This regional concentration reflects historical settlement and cultural identity, shaping the local human landscape. Analyzing these patterns is essential for social geography, as it provides insights into how religious identity is tied to specific territories and influences.

238. (B) To accelerate economic growth, social progress, and cultural development in the region.
ASEAN is a regional organization established to promote economic, social, and cultural cooperation among its member states in Southeast Asia. Its goal is to foster regional stability and progress through shared initiatives and dialogue. By addressing common challenges and facilitating development, the organization aims to improve the quality of life for the people in the region and maintain a stable political.

239. (A) Disease Ecology

the political consequences of environmental shifts. While disease ecology is a vital geographic field, it belongs to the sub-discipline of medical geography rather than the core study of political.

222. (A) Cultural and Social Geography
The distinct cultural traits and social organization of the Santhal tribe, compared to other groups, highlight the core themes of cultural and social geography. This field examines how social identity and cultural practices are organized across the landscape and how they influence the human experience. Understanding these differences is essential for analyzing the diverse cultural landscape of India and the.

223. (A) Health Care Planning
The 'Ayushman Bharat' scheme is a significant national health policy in India aimed at providing financial protection and access to quality medical services for vulnerable populations. It is a core component of the country's health care planning, focusing on improving the overall health outcomes and reducing the economic burden of illnesses. This initiative illustrates the government's efforts to enhance social well-being.

224. (C) Statement I is false, but Statement II is true.
The neopolitics of world natural resources focuses on contemporary and emerging political dynamics related to the control of essential materials in a globalized world. It highlights how the uneven distribution of resources like energy and minerals continues to shape international relations today. Understanding these modern struggles for resource security is vital for analyzing global conflict and the strategic interests of.

225. (A) P-3, Q-1, R-2, S-4
India's linguistic landscape shows a distinct regional distribution of major language families, with Tamil Nadu being a primarily Dravidian-speaking area. States like Uttar Pradesh and West Bengal are core regions for Indo-Aryan languages, while Nagaland's population predominantly speaks Sino-Tibetan languages. These patterns are essential for understanding the social geography of India and how linguistic identity is tied to specific territories.

226. (B) A voter's decision based on the government's performance on economic issues.
A voter's decision based on government performance is a direct determinant of electoral behavior, showing how political and economic factors influence democratic choices. Analyzing these factors is a core task of electoral geography, as it reveals the spatial patterns of political support and the diverse forces that drive voter decisions. Understanding these determinants is essential for explaining poll outcomes and the.

227. (A) Cultural Ecology
The concept of cultural landscape examines how human societies modify their natural environment to create culturally significant spaces, a core theme in cultural ecology. This field explores the dynamic relationship between culture and nature, looking at how environmental factors shape cultural traits and how human activity in turn transforms the land. Understanding these interactions is vital for analyzing the diversity.

228. (B) A Trend in Political Geography (Supranationalism)
The creation of the European Union is a prominent example of supranationalism, where states pool sovereignty to achieve common political and economic goals on a regional scale. This development is a key trend in modern political geography that challenges traditional concepts of the nation-state and boundaries. Analyzing such organizations helps scholars understand how globalization is reshaping the global political landscape.

229. (A) Both A and R are true and R is the correct explanation of A.
Medical tourism offers significant economic opportunities for host countries but also presents challenges like the potential 'brain drain' of medical professionals. While it brings in foreign revenue, the growth of high-paying private sector jobs for international patients can strain public health services and reduce the availability of skilled doctors for the local population. This situation illustrates the complex trade-offs.

230. (A) India
The MacMahon Line is a boundary of major significance in the political geography of India, marking the frontier between its northeastern

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248. (B) Electoral Reforms
The introduction of Electronic Voting Machines and Voter Verifiable Paper Audit Trails in India are significant electoral reforms designed to enhance the transparency and fairness of the democratic process. These measures promote public trust in elections and prevent the misuse of the voting system. By adopting such technology, the government seeks to maintain the integrity of the democratic system and ensure.

249. (A) Both A and R are true and R is the correct explanation of A.
The Rimland Theory is a cornerstone of classical geopolitics as it provided a maritime-based strategic counter-perspective to Mackinder's Heartland Theory. By emphasizing the strategic importance of the coastal regions of Eurasia, it influenced geopolitical thought and strategy for several decades. This perspective highlights the importance of the maritime fringe in global power dynamics and provided an alternative framework for analyzing.

250. (A) Disease Ecology
The study of how cultural practices like dietary habits and sanitation customs influence the spread of disease is a key aspect of disease ecology. This field explores the relationship between human behavior, the environment, and health outcomes to understand why certain illnesses occur in specific populations. By analyzing these links, geographers can better understand the human condition and contribute to designing.

251. (B) (B) Cultural Complex
Cultural complexes represent the next hierarchical level in cultural geography after individual traits. They consist of a unique cluster of traits that are functionally interrelated and form a distinct system. This concept helps geographers identify specific cultural groupings before they are mapped onto broader spatial territories such as cultural areas or expansive geographical regions.

252. (A) (A) A cultural region is a broader territory sharing significant traits compared to a more specific cultural area.
Within the spatial hierarchy of cultural geography, a cultural region encompasses a vast territory where inhabitants share significant cultural traits, fostering a cohesive sense of identity. In contrast, a cultural area is typically defined more specifically as a region where a particular cultural complex is predominant among the population who reside within those geographical borders.

253. (C) (C) Tangible and intangible elements
Cultural heritage is a vital legacy preserved for future generations, comprising two distinct yet interconnected forms. Tangible elements include physical monuments and artifacts that represent a society's history. Intangible elements encompass living traditions, languages, and shared practices. Together, these components help define the unique cultural identity of a group and its historical continuity through the ages.

254. (D) (D) To understand the spatial mosaic and geographical expression of human societies and identities.
The study of cultural areas and regions provides a fundamental framework for understanding the spatial mosaic of human societies. By demarcating these spaces, geographers can analyze how distinct identities are formed and geographically expressed. This analysis reveals how historical processes and social interactions shape the complex tapestry of human geography in different places around the world.

255. (C) (C) Dynamic spaces shaped by historical processes and interactions.
Cultural regions are characterized by their fluid and evolving nature rather than being fixed or permanent fixtures. These territories are dynamic spaces continuously shaped by historical processes, social interactions, and cultural shifts. Understanding this dynamism is crucial because it reflects how human identities and spatial expressions adapt over time to changing circumstances and new cultural influences.

256. (B) (B) Cultural Ecology
Cultural Ecology serves as a specialized field that investigates the intricate relationship between human societies and their physical surroundings. It focuses on how cultures actively adapt to environmental opportunities and constraints. This dynamic interplay involves modifying technologies and social structures, ultimately producing unique cultural landscapes that reflect

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Classifying diseases based on their mode of transmission, such as vector-borne or water-borne, is fundamental to the field of disease ecology. This discipline explores the relationship between the environment and human health to understand how illnesses spread across different geographical areas. By identifying these environmental links, geographers and health professionals can design more effective interventions to prevent outbreaks and improve.

240. (A) Geopolitics of Climate Change
The strategic and political issues arising from melting Arctic ice and the resulting competition for newly accessible resources are prime examples of the geopolitics of climate change. Environmental shifts are creating new strategic challenges and territorial disputes among northern nations, illustrating how climate change can alter political boundaries and international relations. This field is essential for understanding the future strategic landscape.

241. (A) 1, 2 and 3 only
Boundaries and frontiers are distinct geographic concepts used to define state territory and zones of transition. While boundaries are precisely demarcated lines that can be sources of conflict, frontiers are broader areas where authority may not be fully established. Demarcating these lines and managing these zones have significant social and economic consequences for states and local populations, making them a central focus.

242. (A) Caste system
The caste system is a unique form of social stratification in India that has significant spatial manifestations, influencing residential layouts and social interactions in villages and cities. This enduring pattern of social hierarchy is a core theme in Indian social geography, as it shapes the organization of the human landscape and the nature of community life. Understanding these patterns is essential.

243. (A) Medical Geography
The study of the relationship between diet, nutritional deficiencies, and health outcomes is a central topic in medical geography. This field examines how environmental and social factors influence the spatial distribution of illnesses and nutritional status in a population. By identifying these links, researchers can help design more effective health policies and interventions to improve human well-being and address health.

244. (C) Statement I is false, but Statement II is true.
Social exclusion is a process where individuals or groups are systematically blocked from rights and opportunities, rather than a voluntary choice to isolate themselves. This marginalization based on identity creates barriers to accessing essential resources like education and healthcare. Analyzing these patterns of exclusion is a key task for social geographers, as it reveals the spatial consequences of inequality and.

245. (B) P-2, Q-3, R-1, S-4
Regional organizations are defined by their specific geographical focus, with SAARC centered on South Asia and the EU on Europe. ASEAN consists of member states in Southeast Asia, while OPEC represents petroleum-exporting nations, primarily in the Middle East. Identifying the correct regional focus of these organizations is essential for understanding international cooperation and the spatial organization of global economic and.

246. (B) The political conflicts and strategies concerning resource control in the contemporary era.
The neopolitics of world natural resources focuses on modern struggles between states to secure access to essential materials in a globalized world. It examines how the uneven distribution of resources like oil and minerals drives international competition and shapes foreign policy decisions today. Understanding these contemporary struggles for resource security is vital for analyzing global conflict and the strategic interests of.

247. (B) Urbanization and the resulting changes in social relationships
Urbanization and the changing nature of social relationships that come with it are classic examples of social processes. These dynamic interactions and activities occur within society and lead to the constant evolution of social structures over time. Unlike physical cycles, social processes are driven by human behavior and have significant spatial and social consequences for the organization of human activities.

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Geopolitical and political entities can be organized by their geographical scale, from the most expansive to the most localized. The World-Island represents the largest landmass unit, followed by strategic regions like the Heartland. Federal states are further divided into provinces, and the smallest unit of electoral organization is the individual constituency. This hierarchy allows for the analysis of political processes.

178. (B) The control over strategic sea lanes and chokepoints.
The geopolitics of the Indian Ocean is primarily concerned with the strategic control of sea lanes and maritime chokepoints, which are vital for global trade and security. This region is a major corridor for international commerce, leading to competition among global and regional powers for naval influence and resource access. Analyzing these dynamics is essential for understanding international stability.

179. (B) Social Well-being and Quality of Life
Initiatives focused on improving sanitation, housing, and employment for marginalized communities are direct efforts to enhance their social well-being and quality of life. These policies address basic human needs and promote social inclusion, ensuring that all citizens have the resources required for a dignified life. By targeting these areas, the government seeks to reduce disparities and improve the human.

180. (A) Social Process (agglomeration)
The clustering of multinational corporations in specific global cities is an example of the social and economic process of agglomeration. This dynamic interaction occurs as businesses seek the benefits of proximity to resources, markets, and other firms, leading to concentrated spatial patterns of economic activity. Understanding these processes is essential for geographers to explain the growth of urban centers.

181. (A) 1, 2 and 3 only
The geography of federalism focuses on how federal systems manage territorial diversity through the spatial organization of power and the creation of administrative units. It analyzes the interactions between different levels of government and the ways in which regional identities are accommodated within a national framework. This study is essential for understanding the political stability and territorial integrity of states like.

182. (B) The health condition of an individual or a population as influenced by the intake and utilization of nutrients.
Nutritional status is a key topic in health geography that examines how nutrient intake and utilization affect the well-being of a population. Geographers analyze the spatial patterns of malnutrition and the environmental and social factors that influence dietary health. This study is essential for identifying vulnerable regions and helping to design effective public health policies and interventions to improve human.

183. (B) Neopolitics of World Natural Resources
Conflicts in the Middle East are often deeply linked to the control and distribution of vital oil reserves, making them a primary focus of the neopolitics of world natural resources. This field examines how the uneven global distribution of strategic materials drives international tension and influences the foreign policy of major powers. Resource security is a major factor in modern.

184. (B) Both Statement I and Statement II are false.
SAARC and ASEAN are regional organizations with distinct geographical focuses; SAARC is centered on South Asia, while ASEAN consists of member states in Southeast Asia. The statements provided incorrectly swap their locations. Identifying the correct regional focus of these organizations is essential for understanding international cooperation and the spatial organization of political and economic partnerships across the different parts of Asia.

185. (A) P-3, Q-1, R-2, S-4
India's linguistic diversity is reflected in the regional concentration of major language families across its states. Tamil Nadu is a primarily Dravidian-speaking state, while Uttar Pradesh and West Bengal are core regions for Indo-Aryan languages. Nagaland's population predominantly speaks Sino-Tibetan languages, showcasing the unique cultural identity of the northeastern region. Analyzing these patterns is essential for the study of social.

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long-term interaction and active adaptation to the physical environment.

257. (D) (D) Increased similarity and uniformity among different cultures.
Cultural Convergence describes a modern process where different societies develop increasing similarity through shared technology and organizational structures. This trend is largely driven by globalization, migration, and mass media. As these forces intensify, distinct cultural traits often erode, leading to the adoption of more uniform practices and a potential homogenization of cultures across different geographic regions.

258. (A) (A) Cultural Ecology explains cultural divergence due to environment, while Cultural Convergence explains cultural homogenization.
Cultural Ecology and Cultural Convergence highlight different drivers of cultural change. While Cultural Ecology focuses on how varied environments lead to diverse adaptations and cultural divergence, Cultural Convergence emphasizes the role of global interconnection. The former explains uniqueness based on local surroundings, whereas the latter points toward a modern trend of homogenization through technology and organizational sharing.

259. (C) (C) The long-term interaction and adaptation between a human society and its environment.
Cultural landscapes represent the visible imprint of human activity on the physical environment. They are the tangible result of long-term interaction and adaptation between a human society and its surroundings. This process involves the development of cultural practices and technologies that respond to environmental constraints, creating a unique spatial testimony of the relationship between humans and their environment.

260. (A) (A) Globalization and mass media
Several modern forces accelerate the process of Cultural Convergence by facilitating the exchange of information and technology. Globalization and mass media are primary drivers that promote the sharing of similar organizational structures and lifestyle practices. These influences encourage societies to become more alike, often leading to the adoption of uniform cultural traits across different regions of the world.

261. (D) (D) Social Exclusion
Social Exclusion represents a systemic process where specific individuals or groups are blocked from accessing rights, opportunities, and resources available to the rest of society. This practice often leads to significant disadvantages and marginalization. In social geography, it is studied for its role in creating spatial segregation and perpetuating cycles of inequality within various communities across the world.

262. (B) (B) Assess the extent to which people's needs and desires are met.
Indicators of Social Well-being and Quality of Life are essential metrics for assessing the effectiveness of social structures. They measure the extent to which a society meets the essential needs and desires of its members, including health, education, income, and personal freedom. Evaluating these factors helps geographers identify spatial variations in human welfare and development across different regions.

NODIA

263. (C) (C) The concentration of marginalized communities in disadvantaged areas.
A primary spatial consequence of systemic social exclusion is the physical segregation of marginalized groups. This often manifests as the concentration of disadvantaged communities in specific geographic areas. Such regions typically suffer from poorer services and fewer economic opportunities, which serves to reinforce and perpetuate the cycle of disadvantage for the affected populations over many successive generations.

264. (D) (D) Social structure emerges from and determines social processes like conflict and cooperation.
Social structures and social processes are inherently linked within the study of social geography. Social structure refers to the patterned arrangements that emerge from human actions, while social processes like cooperation and conflict represent the manifestation of these structures. The structure determines the actions of individuals, which in turn fuels the processes that shape societal interactions and relationships.

265. (A) (A) The relationships between social phenomena and the spaces they occupy.

verification, scientific laws, and objectivity provided the philosophical foundation for the adoption of statistical and mathematical methods.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

22. Which of the following pairs incorrectly matches a geographical perspective with its core idea?
(A) Humanism - Focuses on lived experience, meaning, and human agency.
(B) Behaviouralism - Analyzes unseen economic structures that determine patterns.
(C) Postmodernism - Critiques grand narratives and deconstructs knowledge.
(D) Structuralism - Explains surface patterns through underlying social structures.

23. Within the dualism of regional versus systematic geography, 'systematic geography' refers to:
(A) The detailed study of a specific, unique area.
(B) The use of computer-based systems for geographic analysis.
(C) The historical evolution of a particular landscape.
(D) The study of a particular category of phenomena or a process as it occurs globally.

24. Match List I with List II and select the correct answer using the codes given below.
List I:(Geographer)
P. Carl Ritter
Q. Richard Hartshorne
R. Fred K. Schaefer
S. Alexander von Humboldt
List II:(Concept/School)
1. Areal Differentiation
2. Spatial Analysis/Scientific Laws
3. Comparative Method/Kosmos
4. Teleological Approach/Erdkunde
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-1, R-2, S-3
(C) P-4, Q-3, R-1, S-2
(D) P-2, Q-1, R-4, S-3

25. The most appropriate description of Immanuel Kant's philosophical contribution to the foundation of geography is that he:
(A) Conducted extensive fieldwork to collect empirical data.
(B) Argued for environmental determinism as the core of geography.
(C) Placed geography within a logical classification of sciences as a chorological discipline.
(D) Developed the first comprehensive world atlas.

26. Consider the following list of geographic traditions:
1. Earth Science
2. Historical analysis
3. Man-environment relationship
4. Area studies
5. Spatial analysis
Which the traditions mentioned above are widely recognized as major geographic traditions?
(A) 1, 2, 3 and 4 only
(B) 1, 3, 4 and 5 only
(C) 2, 3, 4 and 5 only
(D) 1, 2, 4 and 5 only

27. The philosophy of Postmodernism in geography is characterized by all of the following EXCEPT:
(A) A skepticism towards grand theories or meta-narratives.
(B) An emphasis on the role of language and discourse in constructing reality.
(C) A focus on difference, otherness, and marginalized voices.
(D) A search for a single, objective truth through scientific methods.

28. Which scholar is most famously associated with the publication 'Geographia Generalis', which established the foundational dualism between systematic and regional geography?
(A) Immanuel Kant
(B) Bernhardus Varenius
(C) Carl Ritter
(D) Alexander von Humboldt

29. Consider the following statements regarding geographical approaches:
Statement I : The nomothetic approach in geography seeks to identify general laws and

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ensure that interventions are more effective and reach the specific populations most in need.

274. (A) (A) An increase in vector-borne diseases linked to monsoon patterns.
India experiences distinct seasonal patterns in disease prevalence, often tied to its climatic cycles. A notable example is the spike in vector-borne diseases that occurs in association with monsoon patterns. These seasonal fluctuations require geographically sensitive health planning to manage the increased risks effectively. Mapping such occurrences helps in anticipating outbreaks and preparing the necessary medical and preventative responses.

275. (C) (C) Multifaceted, capable of both supporting and threatening health.
The relationship between the environment and human health is multifaceted, as physical surroundings can both support and threaten well-being. Environmental factors may provide essential resources like clean water while also harboring pathogens or toxins. Understanding this dual nature is a central theme in health geography, requiring a comprehensive analysis of how geographical contexts influence overall public health outcomes.

276. (A) (A) To ensure geographical accessibility and equitable service delivery.
Health care planning in India is designed to improve public health outcomes through structured national policies. A primary objective of these initiatives is to ensure geographical accessibility and equitable service delivery across the country. By establishing a hierarchical network of facilities, the government aims to reach diverse populations, from remote rural villages to the most densely populated urban centers.

277. (D) (D) Advanced technology, skilled professionals, and lower costs.
India has emerged as a prominent global destination for Medical Tourism due to several key competitive advantages. These include the availability of advanced medical technology and highly skilled healthcare professionals. Furthermore, the relatively lower cost of specialized treatments compared to Western nations attracts international patients, contributing significantly to the national economy and the expansion of high-end medical infrastructure and services.

278. (B) (B) The potential diversion of resources from the public health system.
While Medical Tourism brings economic benefits, it also raises significant concerns regarding domestic equity. A primary issue is the potential diversion of vital resources, such as skilled personnel and funding, away from the public health system. This shift could impact the quality and availability of healthcare for the majority of the domestic population who rely on these public services.

NODIA

279. (C) (C) Improve geographical access to healthcare.
The creation of a hierarchical network of health facilities is a strategic component of Indian healthcare planning. This system organizes care from primary health centers in rural areas to specialized urban hospitals. The fundamental purpose is to improve geographical access to healthcare services, ensuring that different levels of medical needs are met efficiently across both rural and urban territories.

280. (D) (D) Major metropolitan areas.
The development of high-end medical infrastructure in India, largely driven by the demands of Medical Tourism, shows a distinct spatial concentration. These advanced facilities are primarily located in major metropolitan areas where there is better connectivity and infrastructure. While this boosts local economies in cities, it highlights the geographical disparities in the distribution of specialized healthcare resources across the nation.

281. (A) (A) A boundary is a clearly defined line, whereas a frontier is a zone of separation.
In political geography, a boundary is defined as a precise, clearly established line that marks the limit of a state's territory. In contrast, a frontier is a broader zone of separation between states, which is often sparsely populated and lacks full integration. Understanding these differences is essential for analyzing how sovereign political power is spatially demarcated and maintained globally.

282. (B) (B) The Eurasian landmass (Heartland)

(B) Positivism
(C) Feminism
(D) Behaviouralism

8. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.

Assertion (A) : Alexander von Humboldt and Carl Ritter are considered the founders of modern geography.

Reason (R) : Both Humboldt and Ritter adopted an empirical, observational approach, but Ritter emphasized a teleological and deductive framework while Humboldt favored an inductive and comparative one.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

9. The contributions of Arab scholars were significant in preserving and advancing geographical knowledge during the medieval period. Which of the following was a primary focus of their work?

(A) Developing the core philosophy of humanism within the context of regional geography.
(B) Formulating universal laws of spatial distribution through advanced statistical analysis.
(C) Mapping and documenting mathematical geography through extensive travel and astronomy.
(D) Initiating the fundamental dualism between systematic study and regional geography.

10. The concept of a 'Paradigm Shift' in geography, most famously associated with the Quantitative Revolution, is best understood as:

(A) A fundamental change in the basic concepts and experimental practices of a discipline.
(B) A minor adjustment in methodological techniques used for collecting empirical data.
(C) A gradual evolution of existing theories regarding the nature of spatial interaction.
(D) A complete rejection of all past geographical knowledge in favor of new techniques.

11. Consider the following statements regarding the major geographic traditions:

1. The Earth Science tradition focuses on the study of the planet's physical systems.
2. The man-environment relationship tradition examines the interactions between humans and their natural surroundings.
3. The area studies tradition is primarily concerned with discovering universal spatial laws.
4. The spatial analysis tradition emphasizes the geometric and locational properties of phenomena.

Which of the statements given above are correct?

(A) 1, 2 and 3 only
(B) 1, 2 and 4 only
(C) 2, 3 and 4 only
(D) 1, 3 and 4 only

12. The contributions of Roman scholars to geography were characterized by which primary interest?

(A) Philosophical speculation about the Earth's origin.
(B) Practical applications for military campaigns, administration, and trade.
(C) Development of abstract mathematical models of space.
(D) Exploration of human consciousness and sense of place.

13. The ideographic approach in geography is best defined as the study of:

(A) The formulation of general laws and theories.
(B) The quantitative analysis of spatial data.
(C) The unique and particular characteristics of a region or place.
(D) The physical processes shaping the Earth's surface.

14. Arrange the following perspectives in geography in their approximate chronological order of emergence as dominant schools of thought:

1. Positivism/Quantitative Revolution
2. Humanism
3. Environmental Determinism
4. Behaviouralism

Select the correct answer using the codes given

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291. (C) (C) The strategic implications and potential conflicts arising from global warming.
The Geopolitics of Climate Change explores the strategic and political consequences of global warming. It examines potential conflicts that may arise from environmental shifts, such as disputes over newly accessible Arctic routes or competition for resources in drought-affected areas. This field highlights how the changing climate transforms geographical reality, leading to new challenges in international relations and security.

292. (A) (A) It is a critical artery for global trade and energy flows.
The Indian Ocean has become a focal point of global strategic competition due to its role as a critical artery for international trade and energy flows. Major world powers seek to secure their interests by establishing a naval presence and influencing littoral states within this region. Its strategic location makes it essential for maintaining global economic stability and energy security.

293. (D) (D) The contest for control over vital and unevenly distributed materials.
The Geopolitics of World Resources centers on the intense competition for control over vital materials that are distributed unevenly across the globe. These resources include oil, water, and rare earth minerals, all of which are essential for maintaining economic prosperity and military power. This field analyzes how states maneuver to secure these materials, highlighting the link between geography and power.

294. (B) (B) Conflicts over melting Arctic routes.
Within the broader field of the Geopolitics of Climate Change, several specific strategic challenges are identified. One prominent example is the potential for conflict over melting Arctic routes. As ice recedes, new maritime paths become available, leading to competition among nations for control over these valuable trade corridors. This demonstrates how environmental changes directly impact the strategic interests of global powers.

295. (C) (C) Intrinsically linked to the control and strategic use of geographical spaces and resources.
The central theme is that contemporary power politics is inextricably linked to the control and strategic management of geographical spaces. Whether dealing with climate change or resource distribution, nations compete to exploit geographical advantages for gain. This underscores that geography remains a key element in shaping international relations and the exercise of power on a global scale.

296. (D) (D) OPEC
The Organization of the Petroleum Exporting Countries, known as OPEC, functions as a specialized international cartel. Its primary mission is to coordinate and unify the petroleum policies of its member countries. By doing so, OPEC aims to ensure the stabilization of oil markets and secure efficient, economic, and regular supplies of petroleum to global consumers while maintaining steady income for producers.

297. (A) (A) The European Union (EU)
The European Union (EU) is recognized as representing the deepest and most comprehensive model of regional integration. Beyond simple economic cooperation, it features a single market that allows for the free movement of goods, services, and people. Additionally, the EU involves a significant degree of political union among its member states, setting it apart from other regional organizations with more limited goals.

298. (B) (B) Involves non-state actors, corporations, and supply chain security.
The Neopolitics of World Natural Resources represents a modern shift in how resource control is analyzed. Unlike traditional state-centric geopolitics, this concept incorporates the significant influence of non-state actors and transnational corporations. It also emphasizes the complex interplay between technological advancements, environmental concerns, and supply chain security. This broader perspective reflects the evolving strategic landscape for natural resources in the current century.

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299. (B) (B) Accelerating economic growth and promoting regional peace.
The Association of Southeast Asian Nations (ASEAN) is a regional organization with specific developmental and security goals. Its primary

Sir Halford Mackinder's Heartland Theory is a foundational concept in classical geopolitics. It proposed that the vast Eurasian landmass, referred to as the Heartland, was the strategic center of world power. Mackinder argued that any state capable of controlling this central region would possess a decisive advantage, ultimately allowing them to dominate global political and military affairs over time.

283. (B) (B) Nicholas Spykman
Nicholas Spykman developed the Rimland Theory as a direct response to Mackinder's earlier Heartland Theory. Spykman shifted the focus of strategic importance from the central landmass to the coastal fringes of Eurasia. By emphasizing the role of the Rimland, he provided an alternative framework for understanding global power dynamics, influencing strategic thinking during and after the mid-twentieth century history.

284. (A) (A) The coastal fringes surrounding the Eurasian landmass.
Spykman's Rimland Theory identifies the coastal fringes surrounding Eurasia as the most strategically vital area for global dominance. He argued that control over this maritime-oriented zone was the key to ruling Eurasia and, consequently, determining the fate of the entire world. This theory highlights how geography and access to sea routes are critical factors in international power struggles.

285. (C) (C) Boundaries and Frontiers.
The paragraph uses India's relationships and border situations with its neighbors to exemplify core concepts in political geography. Specifically, it illustrates the differences between boundaries and frontiers by showing how varied demarcation statuses exist across the region. This case study demonstrates how territorial lines and zones of separation function in a complex, real-world geopolitical environment between various sovereign nations.

286. (D) (D) The spatial division of power between national and sub-national governments.
The Geography of Federalism investigates the spatial dimensions of political power within a state. It focuses on how authority is divided and shared between a central national government and various sub-national units. This field examines the impact of these arrangements on regional development and political stability, providing a geographical lens for understanding the complex internal governance of federal systems.

287. (C) (C) Spatial factors like regional identity and urban-rural divides influence voting.
Geographers study the determinants of electoral behavior to understand how spatial factors influence voting patterns. This analysis explores the impact of regional identity, the divide between urban and rural areas, and local issues on the choices made by voters. By mapping these factors, researchers can gain insights into how geographical context shapes the outcomes of democratic processes and political representation.

288. (B) (B) Electoral Geography
In the contemporary analysis of India's political landscape, the Geography of Federalism is closely interconnected with electoral geography. This relationship is essential for understanding how the spatial division of power and electoral systems influence each other. By examining both fields together, geographers can better analyze political representation, the impact of reforms, and the functioning of democracy at different levels.

289. (D) (D) Changes in constituency delimitation.
Electoral reforms are vital for maintaining fair political representation in a democracy. One specific example mentioned in the study of India's electoral geography is the change in constituency delimitation. This process involves redrawing the boundaries of electoral districts to account for population changes. Such reforms ensure that the spatial organization of voting remains equitable and reflects current demographic realities.

290. (A) (A) Provide insights into the functioning of democracy and regional political variations.
Analyzing electoral behavior from a geographical perspective serves a critical role in understanding the functioning of democracy. It provides deep insights into how spatial factors create regional variations in political outcomes and the nature of power. This approach moves beyond simple data analysis by incorporating the vital element of space, revealing the underlying reasons for diverse voting patterns.

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CHAPTER 08

Geographic Thought

1. Which group of scholars is credited with laying the foundational, systematic basis for the discipline of geography, including concepts of a spherical Earth and climatic zones?
(A) Roman scholars
(B) Greek scholars
(C) Chinese scholars
(D) Arab scholars

2. The dualism of 'physical versus human geography' represents a fundamental division within the discipline concerning its primary focus. What is the core of this dualism?
(A) The debate over whether to study the natural environment or human societies.
(B) The conflict between qualitative and quantitative methods.
(C) The argument between studying specific places versus universal laws.
(D) The choice between mapping physical features and analyzing spatial patterns.

3. Consider the following statements regarding Immanuel Kant's contribution to geography:
Statement I : Kant classified knowledge into systematic sciences, historical sciences, and geographical sciences.
Statement II : According to Kant, geography is a chorological science, concerned with phenomena that exist together in space.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

4. Which of the following statements correctly identifies a core tenet of Positivism in geography?
(A) It emphasizes subjective experience and personal consciousness in interpreting geographic locations.
(B) It rejects scientific methodology in favor of localized interpretive and qualitative analysis.
(C) It focuses on uncovering the underlying social structures of systemic power and inequality.
(D) It identifies universal laws and spatial theories through empirical and verifiable data.

5. Match List I with List II and select the correct answer using the codes given below.
List I:(Perspective)
P. Behaviouralism
Q. Humanism
R. Structuralism
S. Positivism
List II:(Central Focus)
1. Unseen social structures and class conflict
2. Objective, law-making science of spatial relations
3. Individual's subjective experience and consciousness
4. Decision-making processes based on perceived environment
Codes:
(A) P-4, Q-3, R-1, S-2
(B) P-3, Q-4, R-2, S-1
(C) P-4, Q-1, R-3, S-2
(D) P-2, Q-3, R-1, S-4

6. The man-environment relationship is a central theme in geography. Which of the following is NOT a major perspective within this tradition?
(A) Environmental Determinism
(B) Spatial Analysis
(C) Possibilism
(D) Neo-determinism

7. A geographer studying the shopping patterns of consumers by analyzing their mental maps and perceptions of distance to different malls is primarily applying the principles of which perspective?
(A) Structuralism

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The core focus of social geography involves examining the intricate relationships between social phenomena and the spaces they occupy. This field analyzes how social structures, processes, and outcomes like well-being or exclusion are distributed across territory. By understanding these spatial patterns, researchers can develop better policies to address regional inequalities and improve the human condition in diverse contexts.

266. (B) (B) Hilly and forested tracts
In the social geography of India, tribal populations exhibit distinct spatial patterns linked to specific ecological niches. These groups are predominantly concentrated in hilly and forested tracts, particularly across Central and North-East India. This distribution reflects a long-standing historical and cultural relationship with these environments, which have shaped their traditional ways of life and unique cultural identities over time.

267. (B) (B) Language
Language serves as a powerful marker of identity in India, leading to the delineation of major linguistic regions across the country. The current political map, specifically the boundaries of various states, largely conforms to these linguistic divisions. This alignment demonstrates the significant role of language in shaping the administrative and political organization of the Indian territory throughout its post-independence history.

268. (A) (A) It is a product of historical, political, and socio-economic processes.
The spatial distribution of various social groups in India is not a random occurrence. Instead, it is the complex result of historical migrations, evolving political configurations, and various socio-economic processes. These factors have worked together over centuries to create a unique spatial mosaic of tribes, castes, religions, and languages that defines the nation's social landscape and regional identities.

269. (C) (C) Distinct religio-cultural regions.
The distribution of religious communities such as Hindus, Muslims, Christians, and Sikhs across India shows significant regional variation. This diversity leads to the formation of distinct religio-cultural regions, where specific religious identities are more prevalent. Mapping these patterns is essential for understanding regional social dynamics and the unique cultural heritage associated with different parts of the diverse country.

270. (D) (D) The caste system
Despite its constitutional abolition as a basis for discrimination, the caste system remains a significant factor in India's social geography. It continues to exert a profound influence on settlement patterns and social interactions, especially within rural landscapes. Understanding these persistent spatial dimensions is vital for analyzing the ongoing challenges related to social equity, territorial organization, and national integration.

271. (C) (C) The study of interactions among hosts, pathogens, and the environment.
Disease Ecology focuses on the spatial and temporal patterns of illnesses by analyzing complex biological and environmental relationships. It investigates the interactions among hosts, pathogens, and the surrounding environment to understand why diseases occur in specific places. This field provides critical insights into the prevalence of health issues and informs the development of effective, targeted health prevention strategies.

272. (B) (B) The nutritional status of a population.
Nutritional status is a key indicator of human well-being and is heavily influenced by various etiological conditions. These factors include poverty, the availability of food, and diverse cultural practices that dictate dietary habits. By mapping the impact of these conditions, researchers can identify spatial and seasonal patterns of nutritional deficiencies or excesses within a specific population or geographic region.

273. (D) (D) It is essential for effective and targeted public health interventions.
Analyzing the spatial and seasonal distributional patterns of health and nutrition is vital for public health management. These insights allow for the implementation of targeted resource allocation and the creation of preventative strategies. By focusing on local geographical and environmental contexts, health authorities can

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below.
(A) 3, 1, 4, 2
(B) 1, 3, 2, 4
(C) 3, 2, 1, 4
(D) 2, 4, 3, 1

15. Consider the following statements regarding mid-20th century intellectual conflicts in geography:
Statement I : The Schaefer-Hartshorne debate was a pivotal intellectual conflict in mid-20th century American geography.
Statement II : Schaefer argued for an exceptionalist, ideographic approach, while Hartshorne advocated for a law-seeking, nomothetic approach.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

16. Which of the following pairs correctly matches a geographical dualism with its description?
(A) Regional vs. Systematic: The debate between studying Earth's physical features and human activities.
(B) Ideographic vs. Nomothetic: The tension between studying unique cases and formulating general laws.
(C) Qualitative vs. Quantitative: The conflict between field observation and laboratory experiments.
(D) Physical vs. Human: The choice between historical geography and contemporary geography.

17. A geographer investigates how urban planning in a city has historically prioritized male-dominated employment sectors and transport routes, marginalizing women's access to resources. This study most closely aligns with which geographical perspective?
(A) Positivism
(B) Feminism
(C) Behaviouralism
(D) Structuralism

18. Consider the following statements about the contributions of key geographers:
1. Bernhardus Varenius is credited with establishing the dualism of General (Systematic) and Special (Regional) geography.
2. Alexander von Humboldt's 'Kosmos' was a holistic work attempting to unify the diverse phenomena of the natural world.
3. Carl Ritter is known for his teleological approach, viewing the Earth as designed by God for human development.
4. Richard Hartshorne, in 'The Nature of Geography', argued for geography as a chorological science focused on areal differentiation.
5. Fred K. Schaefer criticized Hartshorne's 'exceptionalism' and advocated for a more scientific, law-seeking geography.

Which of the statements given above are correct?
(A) 1, 2 and 4 only
(B) 2, 3 and 5 only
(C) 1, 3, 4 and 5 only
(D) 1, 2, 3, 4 and 5

19. Ancient Indian scholars made contributions to geography, particularly in the fields of:
(A) Political and military mapping.
(B) The development of quantitative spatial models.
(C) Philosophical cosmography and astronomy.
(D) The critique of environmental determinism.

20. What was a primary impact of Darwinian theory on geographical thought in the late 19th century?
(A) It led to the development of humanistic geography and the study of human agency.
(B) It initiated the quantitative revolution and the search for universal spatial laws.
(C) It caused a shift towards postmodernist critiques regarding traditional grand theories.
(D) It provided a scientific basis for determinism and viewing societies as organisms.

21. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The rise of Positivism in geography is closely linked to the Quantitative Revolution of the 1950s and 1960s.
Reason (R) : Positivism's emphasis on empirical

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focus is on accelerating economic growth within its member states and promoting regional peace and stability. By fostering cooperation among the nations of Southeast Asia, ASEAN seeks to create a more prosperous and secure environment for its diverse and growing populations.

300. (A) (A) Represent different models and depths of regional integration.
By examining organizations like SAARC, ASEAN, OPEC, and the EU, it becomes clear that regional cooperation takes many different forms. These organizations illustrate a wide range of models and varying depths of integration, from social upliftment to deep political union or resource management. This variety shows how different regions adapt cooperative structures to meet their specific economic and political needs.

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principles that explain spatial patterns.
Statement II : The ideographic approach focuses on the unique characteristics and detailed description of individual places.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

30. Which of the following statements about the contributions of Chinese scholars to geography is most accurate?
(A) They focused on philosophical dualisms like physical versus human geography.
(B) Their contributions primarily comprised literary descriptions of imaginary lands.
(C) They were the first to propose the specific theory of environmental determinism.
(D) They developed advanced cartography and maintained records for administration.

31. Consider the following statements about Humanism in geography:
1. It emerged as a critique of the mechanistic models of positivism and behaviouralism.
2. It values subjective human experience, values, and intentions.
3. It often employs qualitative methodologies like phenomenology and existentialism.
4. It seeks to formulate universal laws of human spatial behavior.

Which of the statements given above are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

32. The area studies tradition in geography is best represented by:
(A) The formulation of a general theory regarding industrial location.
(B) The in-depth study of regional physical and human characteristics.
(C) The analysis of a single environmental variable across the globe.
(D) The development of statistical models used to predict urban growth.

33. Which of the following is an example of the 'Earth Science' tradition in geography?
(A) A study of voting patterns in a city.
(B) An analysis of the formation and distribution of glacial moraines.
(C) A research on the impact of colonialism on land use.
(D) An investigation into the mental maps of commuters.

34. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The Schaefer-Hartshorne debate highlighted the dualism between the ideographic and nomothetic approaches in geography.
Reason (R) : Hartshorne defended the traditional view of geography as an ideographic discipline focused on areal differentiation, while Schaefer argued for a shift towards a law-seeking, nomothetic science.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

35. The dualism of 'qualitative vs. quantitative' in geography primarily concerns:
(A) The subject matter of study.
(B) The chronological focus of the research.
(C) The methodological and analytical approach used in research.
(D) The scale of the geographical inquiry.

36. The perspective of Structuralism in geography, particularly influenced by Marxism, would most likely analyze a city's landscape in terms of:
(A) The individual perceptions and cognitive choices of its diverse residents.
(B) The unique history and specific cultural heritage of the city's population.
(C) A statistically verifiable model regarding the urban land use zones.
(D) Manifestations of class struggle and the global circulation of capital.

37. Arrange the following key works in geographical thought in chronological order:
1. The Nature of Geography (Hartshorne)

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of inductive reasoning.
2. Carl Ritter was a proponent of deductive reasoning.
3. Richard Hartshorne advocated for an ideographic approach.
4. Fred Schaefer advocated for a nomothetic approach.

Which of the statements given above are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

73. The primary goal of a postmodernist critique in geography would be to:
(A) Formulate a more accurate and universal grand theory.
(B) Deconstruct existing geographical knowledge to reveal its hidden biases and power relations.
(C) Quantify spatial patterns with greater statistical precision.
(D) Create a perfect, objective map of the world.

74. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Carl Ritter's geographical work is described as teleological.
Reason (R) : He believed that the physical features of the Earth were divinely created with the purpose of guiding human development and history.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

75. The tradition of 'man-environment relationship' in geography explores themes such as:
(A) Geomorphology and climatology.
(B) Location theory and network analysis.
(C) Determinism, possibilism, and cultural ecology.
(D) Regional synthesis and chorology.

76. The work of ancient Indian scholars in geography, as mentioned in texts like the Vedas and Puranas, was primarily concerned with:
(A) Creating nautical charts for overseas trade.
(B) Developing theories of urban location.
(C) Cosmography, mythology, and rudimentary mapping of the known world.
(D) A scientific critique of environmental determinism.

77. Match List I with List II and select the correct answer using the codes given below.
List I:(Dualism)
P. Physical vs. Human
Q. Regional vs. Systematic
R. Ideographic vs. Nomothetic
S. Qualitative vs. Quantitative
List II:(Core Question)
1. Should we seek general laws or describe unique cases?
2. How should we analyze data: through interpretation or through numbers?
3. Should we study natural phenomena or human activities?
4. Should we study holistic regions or topical phenomena?

Codes:
(A) P-3, Q-4, R-1, S-2
(B) P-3, Q-1, R-4, S-2
(C) P-1, Q-2, R-3, S-4
(D) P-4, Q-3, R-2, S-1

78. A key difference between Alexander von Humboldt and Carl Ritter was that:
(A) Humboldt focused on human geography while Ritter focused on physical geography.
(B) Humboldt adopted an inductive, comparative approach while Ritter adopted a deductive, teleological approach.
(C) Ritter traveled extensively while Humboldt was an 'armchair' geographer.
(D) Humboldt wrote in German while Ritter wrote in Latin.

79. The study of how people form 'mental maps' of their environment is a hallmark of which geographical perspective?
(A) Positivism
(B) Behaviouralism
(C) Structuralism
(D) Postmodernism

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world.
(C) The way phenomena are arranged in space.
(D) The formulation of universal scientific laws.

46. Which school of thought would be most critical of the idea that there is a single, objective, and universally valid way of representing the world on a map?
(A) Positivism
(B) Postmodernism
(C) Behaviouralism
(D) Earth Science Tradition

47. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Bernhardus Varenius divided geography into 'Geographia Generalis' and 'Geographia Specialis'.
Reason (R) : This division laid the groundwork for the modern dualism between systematic and regional geography.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following represents a key concern of the 'spatial analysis' tradition in geography?
(A) The unique cultural landscape of a particular village.
(B) The geomorphological history of a mountain range.
(C) The geometric patterns of cities and the principles of location.
(D) The subjective meaning of 'home' for different individuals.

49. Among the various dualisms in geography, 'regional vs. systematic' is a debate about:
(A) The level of human impact on the environment.
(B) The best way to organize geographical knowledge and research.
(C) The use of maps versus textual descriptions.
(D) The moral and ethical responsibilities of the geographer.

50. The philosophical stance that reality is socially constructed and that 'grand theories' are instruments of power is central to:
(A) Humanism
(B) Positivism
(C) Postmodernism
(D) Structuralism

51. Consider the following statements about the major dualisms in geography:
1. 'Physical vs. Human' is a dualism of subject matter.
2. 'Systematic vs. Regional' is a dualism of method and organization.
3. 'Ideographic vs. Nomothetic' is a philosophical dualism concerning the goal of inquiry.
4. 'Qualitative vs. Quantitative' is a dualism of analytical technique.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

52. The ancient Greek scholars' primary contribution to geography was their:
(A) Focus on human-environment interaction from a deterministic viewpoint.
(B) Development of an empirical and philosophical framework for studying the Earth.
(C) Creation of detailed administrative maps for an expanding empire.
(D) Rejection of observation in favor of religious texts.

53. 'The Nature of Geography' by Richard Hartshorne is a seminal work that strongly argued for geography as:
(A) A law-making, nomothetic science.
(B) An environmental science focused on physical processes.
(C) A chorological science concerned with areal differentiation.
(D) A tool for social critique and political action.

54. Which of the following is NOT a characteristic of the Positivist approach in geography?
(A) Emphasis on objectivity and value-neutrality.

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2. German (Prussian)
3. German (Dutch born)
4. German (Prussian)

Codes:
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-3, R-4, S-1

107. Which of the following represents the core argument of Fred K. Schaefer in his article "Exceptionalism in Geography: A Methodological Examination"?
(A) Geography should adopt the methods of science to formulate laws and theories.
(B) Geography is a unique discipline that should focus only on regional description.
(C) Geography's main goal is to appreciate the aesthetic qualities of landscapes.
(D) Geography should be merged with history to form a new discipline.

108. The concept of 'mental map' is central to which geographical perspective?
(A) Structuralism
(B) Positivism
(C) Behaviouralism
(D) Feminism

109. Consider the following statements about different geographical perspectives:
1. Positivism seeks objective, verifiable knowledge.
2. Behaviouralism studies the role of cognition in spatial decision-making.
3. Humanism focuses on subjective experience and meaning.
4. Structuralism analyzes the impact of underlying societal structures.
5. Postmodernism deconstructs texts and critiques meta-narratives.

Which of the statements given above are correct?
(A) 1, 3 and 5 only
(B) 2 and 4 only
(C) 1, 2, 3 and 4 only
(D) 1, 2, 3, 4 and 5

110. The teleological approach, famously adopted by Carl Ritter, implies that:
(A) All phenomena can be explained by a single cause.
(B) Geographical features exist to fulfill a grander purpose or design.
(C) The only valid knowledge is that gained through direct observation.
(D) Human actions are completely determined by the environment.

111. The dualism between 'qualitative' and 'quantitative' geography became particularly pronounced after which major event in the discipline's history?
(A) The voyages of discovery.
(B) The publication of Humboldt's Kosmos.
(C) The Quantitative Revolution.
(D) The rise of postmodernism.

112. A research paper titled "The Role of Global Finance in Shaping the Urban Landscape of Mumbai" would most likely be written from which perspective?
(A) Behaviouralist
(B) Humanist
(C) Structuralist
(D) Positivist

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113. Contemporary trends in Indian cartography would involve all of the following EXCEPT:
(A) The use of GIS and remote sensing for map-making.
(B) The creation of thematic maps for planning and development.
(C) The rediscovery of ancient mapping techniques for modern use.
(D) The development of digital atlases and web-based mapping services.

114. Arrange the following contributors to geographical thought in chronological order:
1. Arab Geographers (e.g., Al-Idrisi)
2. Greek Geographers (e.g., Eratosthenes)
3. Varenius and Kant
4. Roman Geographers (e.g., Strabo)

Select the correct answer using the codes given below.
(A) 2, 4, 1, 3
(B) 1, 2, 4, 3
(C) 2, 1, 4, 3
(D) 4, 2, 1, 3

(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. The tradition of 'area studies' in geography is most closely associated with the concept of:
(A) Spatial interaction models.
(B) Areal differentiation.
(C) The ecosystem.
(D) Social justice.

64. Which of the following questions would a geographer working within the Structuralist perspective most likely ask?
(A) How do individuals perceive their local environment?
(B) What is the unique cultural identity of this region?
(C) How does the global capitalist economy shape the uneven development between this city and its periphery?
(D) What is the statistical correlation between rainfall and crop yield in this area?

65. Consider the following statements about the Schaefer-Hartshorne debate:
1. It took place in the mid-20th century.
2. Hartshorne argued for geography as an ideographic science.
3. Schaefer argued for geography to be a nomothetic science.
4. The debate was a key precursor to the Quantitative Revolution.
5. Hartshorne represented the 'old' guard, while Schaefer represented the push for a 'new', more scientific geography.

Which of the statements given above are correct?
(A) 1, 2 and 3 only
(B) 2, 4 and 5 only
(C) 1, 3, 4 and 5 only
(D) 1, 2, 3, 4 and 5

66. The shift from a geography dominated by regional description to one focused on spatial analysis and model-building is an example of a:
(A) Dualism
(B) Paradigm shift
(C) Thematic contribution
(D) Teleological argument

67. The practical, engineering, and military focus of Roman geography is best exemplified by their contributions to:
(A) Philosophical theories about the cosmos.
(B) Road building, aqueducts, and mapping of conquered territories.
(C) The concept of climatic zones.
(D) The study of human perception and behavior.

68. What defines the nomothetic approach in geographical studies?
(A) The detailed description of unique places.
(B) The search for general laws and theories.
(C) The use of qualitative data and interviews.
(D) The study of historical evolution of landscapes.

69. Consider the following statements regarding Behaviouralism in geography:
Statement I : Behaviouralism in geography focuses on the objective environment as the primary determinant of human action.
Statement II : It introduced the concept of the 'behavioural environment' or 'perceived reality' as mediating between the real world and decision-making.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

70. Which of the following is NOT considered a major dualism in geographic studies?
(A) Physical vs. Human
(B) Regional vs. Systematic
(C) Eastern vs. Western geography
(D) Ideographic vs. Nomothetic

71. A geographer using phenomenology to understand the deep, personal connection residents feel to their lifelong neighborhood is working within which broad perspective?
(A) Positivism
(B) Humanism
(C) Structuralism
(D) Spatial Analysis

72. Consider the following statements:
1. Alexander von Humboldt was a proponent

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(C) A is true but R is false.
(D) A is false but R is true.

88. The main contribution of Roman scholars to geography was primarily:
(A) Theoretical and philosophical
(B) Mathematical and astronomical
(C) Practical and applied
(D) Environmental and ecological

89. A study analyzing how the discourse of "development" has been used to justify the displacement of indigenous communities would be characteristic of which geographical perspective?
(A) Postmodernism
(B) Positivism
(C) Behaviouralism
(D) Earth Science tradition

90. Consider the following statements regarding geographical methods:
Statement I : The dualism of qualitative vs. quantitative methods is absolute, and a geographer must choose one exclusively.
Statement II : Many contemporary geographical studies employ a mixed-methods approach, integrating both qualitative and quantitative techniques.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

91. The Darwinian concept of 'natural selection' was metaphorically applied to geographical thought to develop the idea of:
(A) Areal differentiation
(B) Spatial analysis
(C) Environmental determinism
(D) Central place theory

92. Match List I with List II and select the correct answer using the codes given below.
List I:(School of Thought)
P. Positivism
Q. Behaviouralism
R. Humanism
S. Structuralism
List II:(Key Concept)
1. Sense of Place (Topophilia)
2. Spatial Laws
3. Mode of Production
4. Mental Map
Codes:
(A) P-2, Q-4, R-1, S-3
(B) P-2, Q-1, R-4, S-3
(C) P-3, Q-4, R-1, S-2
(D) P-4, Q-2, R-3, S-1

93. The tradition of geography as an Earth Science would be least concerned with which of the following topics?
(A) Plate tectonics
(B) Climatic change
(C) Electoral geography
(D) Soil formation

94. Which of the following correctly identifies the opposing sides in a major geographical dualism?
(A) Humboldt vs. Ritter
(B) Areal differentiation vs. chorology
(C) Nomothetic vs. Ideographic
(D) Determinism vs. Possibilism

95. Consider the following statements:
1. Fred K. Schaefer was a strong critic of the 'exceptionalist' view of geography.
2. 'Exceptionalism' refers to the idea that geography is unique and cannot be a law-seeking science.
3. Richard Hartshorne was the main proponent of the exceptionalist viewpoint that Schaefer criticized.
4. Schaefer's critique helped pave the way for the Quantitative Revolution.
Which of the statements given above are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

96. The focus on uncovering hidden mechanisms, such as capitalism or patriarchy, that shape the observable spatial patterns is the central goal of:
(A) Humanist Geography
(B) Behavioural Geography
(C) Structuralist Geography
(D) Positivist Geography

NODIA

80. "Thematic contributions" as a contemporary trend in Indian Geography would best be described as:
(A) The development of new software for GIS.
(B) In-depth research and publications on specific topics like agricultural geography, urban geography, or social geography in the Indian context.
(C) A philosophical debate on the nature of geography in India.
(D) The production of general-purpose atlases of India.

81. Which of the following statements inaccurately represents the views of Richard Hartshorne?
(A) Geography is a chorological science.
(B) The central task of geography is areal differentiation.
(C) Geography should strive to be a law-seeking, nomothetic science.
(D) He was critical of environmental determinism.

82. Put the following schools of thought in geography into the correct historical sequence of their dominance:
1. Quantitative Revolution (Positivism)
2. Regional Geography (Areal Differentiation)
3. Behaviouralism
4. Postmodernism

Select the correct answer using the codes given below.
(A) 1, 2, 3, 4
(B) 2, 1, 3, 4
(C) 2, 3, 1, 4
(D) 1, 3, 2, 4

83. A city planner wants to understand why a new, objectively superior public transport system is being underutilized. Which geographical perspective would provide the most relevant tools for investigating this problem by focusing on commuters' perceptions, habits, and cognitive barriers?
(A) Structuralism
(B) Positivism
(C) Behaviouralism
(D) Earth Science Tradition

84. Consider the following statements about the perspectives in geography:
1. Positivism advocates for a value-free, objective science of geography.
2. Humanism emphasizes subjective experience and meaning.
3. Feminism seeks to expose and challenge gender bias in geography.
4. Postmodernism is skeptical of all-encompassing theories and objective truth.
5. Structuralism focuses on individual decision-making processes.

Which of the statements given above are correct?
(A) 1, 2, 3 and 4 only
(B) 2, 3, 4 and 5 only
(C) 1, 3 and 5 only
(D) 1, 2, 3, 4 and 5

85. Which scholar is considered to have laid the philosophical groundwork for geography as a distinct field of science by classifying it as a chorological (spatial) science, in contrast to history as a chronological (temporal) science?
(A) Alexander von Humboldt
(B) Carl Ritter
(C) Immanuel Kant
(D) Bernhardus Varenius

86. The concept of "Paradigm Shift" was popularized in the context of the history of science. In geography, the most cited example of such a shift is the:
(A) Rise of humanism
(B) Quantitative Revolution
(C) Debate between Humboldt and Ritter
(D) Emergence of feminist geography

87. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Behavioural geography emerged partly as a critique of the economic models used by positivist geographers.
Reason (R) : Behavioural geographers argued that the assumption of a perfectly rational 'economic man' with complete information was unrealistic and that decisions are made based on a filtered, perceived reality.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

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(B) Use of the scientific method for hypothesis testing.
(C) Focus on individual creativity and subjective interpretation.
(D) Goal of formulating theories and universal laws.

55. Chronologically arrange the following scholars based on their major contributions to geographical thought:
1. Immanuel Kant
2. Richard Hartshorne
3. Bernhardus Varenius
4. Carl Ritter

Select the correct answer using the codes given below.
(A) 3, 1, 4, 2
(B) 1, 3, 4, 2
(C) 3, 4, 1, 2
(D) 4, 1, 3, 2

56. The dualism 'ideographic vs. nomothetic' can be best paralleled with:
(A) Physical vs. Human Geography
(B) Historical vs. Contemporary Geography
(C) Regional vs. Systematic Geography
(D) Qualitative vs. Quantitative Geography

57. Consider the following statements regarding Feminist geography:
Statement I : Feminist geography critiques the androcentric (male-centered) biases in traditional geographical inquiry.
Statement II : It seeks to make women's experiences, roles, and spatialities visible in geographical analysis.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

58. Which group of scholars is particularly known for its contributions to mathematical geography, astronomy, and the preservation of classical geographical knowledge during Europe's Middle Ages?
(A) Roman scholars
(B) Chinese scholars
(C) Indian scholars
(D) Arab scholars

59. Match List I with List II and select the correct answer using the codes given below.
List I:(Geographer)
P. Alexander von Humboldt
Q. Carl Ritter
R. Fred K. Schaefer
S. Bernhardus Varenius
List II:(Term/Work)
1. "Exceptionalism is a crime"
2. 'Kosmos'
3. 'Erdkunde'
4. 'Geographia Generalis'
Codes:
(A) P-1, Q-2, R-4, S-3
(B) P-2, Q-3, R-1, S-4
(C) P-3, Q-2, R-1, S-4
(D) P-2, Q-4, R-3, S-1

60. The 'methodological contributions' mentioned in the context of contemporary trends in Indian geography would most likely refer to:
(A) The mapping of new thematic data.
(B) The development of new field survey techniques and analytical models.
(C) The discovery of new physical landforms in India.
(D) The translation of ancient geographical texts.

61. Which perspective emerged as a reaction against the perceived dehumanization and over-simplification of human behavior in positivist geography?
(A) Structuralism
(B) Postmodernism
(C) Humanism
(D) Environmental Determinism

62. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The impact of Darwin's theory of evolution was profound on the man-environment tradition in geography.
Reason (R) : Concepts like 'struggle for existence' and 'survival of the fittest' were directly applied to human societies, bolstering the arguments of environmental determinism.
(A) Both A and R are true and R is the correct explanation of A.

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97. The contributions of early Chinese scholars to geography were notable for their advancements in:
(A) Philosophical dualism
(B) Cartography and regional inventories
(C) Environmental determinist theories
(D) Humanistic concepts of place

98. The term 'areal differentiation' is most closely associated with which geographer?
(A) Fred K. Schaefer
(B) Richard Hartshorne
(C) Alexander von Humboldt
(D) William Morris Davis

99. A case study that describes the unique history, culture, economy, and landscape of the English Lake District is an example of which approach?
(A) Nomothetic
(B) Systematic
(C) Ideographic
(D) Positivist

100. Feminist geography is a perspective that primarily aims to:
(A) Study the geography of women exclusively.
(B) Prove that geography is a discipline better suited for women.
(C) Create separate geographical theories for men and women.
(D) Challenge and correct the male-centric bias within the discipline of geography.

101. Which of the following geographers established a clear distinction between 'General Geography' and 'Special Geography' in his 17th-century work?
(A) Immanuel Kant
(B) Carl Ritter
(C) Bernhardus Varenius
(D) Alexander von Humboldt

102. Consider the following statements regarding Postmodernism in geography:
Statement I : Postmodernism in geography celebrates the idea of a single, objective reality that can be discovered through scientific inquiry.
Statement II : Postmodernism emphasizes the multiplicity of voices, perspectives, and the role of language in constructing 'truths'.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

103. The 'Quantitative Revolution' in geography during the 1950s and 1960s was philosophically underpinned by:
(A) Humanism
(B) Positivism
(C) Structuralism
(D) Postmodernism

104. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The contributions of Greek scholars were foundational to the Western tradition of geography.
Reason (R) : They moved beyond mythopoeic explanations to develop mathematical and observational methods for understanding the Earth's size, shape, and features.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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105. All of the following are examples of the 'man-environment relationship' tradition EXCEPT:
(A) A study of how climate influenced the character of nations.
(B) A study of how irrigation transforms a desert landscape.
(C) A study of the geometric principles of central place theory.
(D) A study of human adaptation to high-altitude living.

106. Match List I with List II and select the correct answer using the codes given below.
List I:(Scholar)
P. Varenius
Q. Ritter
R. Hartshorne
S. Humboldt
List II:(Region/Nationality)
1. American

2. Kosmos (Humboldt)
3. Geographia Generalis (Varenius)
4. Erdkunde (Ritter)

Select the correct answer using the codes given below.
(A) 3, 2, 4, 1
(B) 1, 3, 2, 4
(C) 3, 4, 2, 1
(D) 2, 4, 3, 1

38. The impact of Darwinian theory on geographical thought is most evident in the development of:
(A) Areal differentiation
(B) Geopolitics and environmental determinism
(C) Spatial analysis and location theory
(D) Humanistic and phenomenological approaches

39. The contemporary trend in Indian geography that focuses on the creation and analysis of maps depicting specific data like population density or soil types falls under which contribution?
(A) Methodological contributions
(B) Thematic contributions
(C) Philosophical contributions
(D) Cartography contributions

40. Which of the following geographers is known for his monumental work 'Erdkunde' and his teleological view that the Earth's continents were designed to shape the course of human history?
(A) Carl Ritter
(B) Alexander von Humboldt
(C) Immanuel Kant
(D) Bernhardus Varenius

41. Match List I with List II and select the correct answer using the codes given below.
List I:(Approach)
P. Positivism
Q. Humanism
R. Behaviouralism
S. Structuralism
List II:(Method)
1. In-depth interviews, phenomenology
2. Analysis of underlying economic and social forces
3. Questionnaires, analysis of perception
4. Statistical modeling, hypothesis testing
Codes:
(A) P-1, Q-3, R-2, S-4
(B) P-4, Q-1, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-4, R-3, S-1

42. Which statement inaccurately describes the perspective of Behaviouralism in geography?
(A) It acts as a bridge between the quantitative models of positivism and the subjective focus of humanism.
(B) It argues that spatial decisions are based on the objective environment, not the perceived one.
(C) It focuses on cognitive processes like perception, mental maps, and decision-making.
(D) It criticizes the 'economic man' assumption of positivist location theories.

43. A study examining the role of patriarchal norms in shaping women's mobility and access to public spaces in rural India is an application of:
(A) Postmodernism
(B) Structuralism
(C) Feminism
(D) Behaviouralism

44. Consider the following statements regarding the contributions of Alexander von Humboldt:
1. He was a proponent of regional geography and focused on specific areas.
2. He emphasized systematic geography and the interconnectedness of natural phenomena.
3. His work 'Kosmos' is a classic example of an inductive and comparative approach.
4. He strongly advocated for a teleological view of nature.
5. He is credited with introducing the use of isotherms on maps.

Which of the statements given above are correct?
(A) 1, 3 and 4 only
(B) 2, 3 and 5 only
(C) 1, 4 and 5 only
(D) 2, 3, 4 and 5

45. The term 'chorology' (or chorological science), as applied to geography by Kant and later Hartshorne, refers to the study of:
(A) The sequence of events over time.
(B) The causal relationships in the natural

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115. A key distinction between the 'area studies' tradition and the 'spatial analysis' tradition is that:
(A) Area studies is qualitative while spatial analysis is always quantitative.
(B) Area studies focuses on synthesis of a place, while spatial analysis focuses on isolating variables and patterns.
(C) Area studies is ideographic, while spatial analysis is also ideographic.
(D) Area studies deals with human geography, while spatial analysis deals with physical geography.

116. Consider the following statements regarding Alexander von Humboldt:
Statement I : Alexander von Humboldt is known for his holistic perspective and emphasis on the interconnectedness of nature.
Statement II : His work, 'Kosmos', was a grand synthesis of scientific knowledge of his time, reflecting an inductive approach to geography.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

117. The primary legacy of ancient Roman geography is its:
(A) Contribution to abstract philosophy.
(B) Development of the concept of possibilism.
(C) Strong practical and utilitarian character.
(D) Focus on the subjective experience of place.

118. Which perspective critiques traditional geography for its universalizing claims and its failure to account for gender as a fundamental organizing principle of society and space?
(A) Behaviouralism
(B) Structuralism
(C) Feminism
(D) Positivism

119. Consider the following statements regarding dualisms in geography:
1. The physical vs. human dualism is a debate over the core subject matter of the discipline.
2. The regional vs. systematic dualism is a debate over the organizational framework of geographical study.
3. The ideographic vs. nomothetic dualism is a debate over the ultimate goal of geographical inquiry (description vs. law-making).
4. These dualisms are often seen as complementary rather than mutually exclusive in contemporary geography.

Which of the statements given above are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

NODIA

120. The application of Darwinian ideas to human societies, which heavily influenced geographical thought in the late 19th century, is often referred to as:
(A) Social Darwinism
(B) Social Humanism
(C) Social Structuralism
(D) Social Possibilism

121. The term 'chorology' emphasizes geography's concern with:
(A) Space
(B) Time
(C) Cause
(D) Form

122. Which scholar's critique of 'exceptionalism' in geography was a catalyst for the Quantitative Revolution?
(A) Fred K. Schaefer
(B) Richard Hartshorne
(C) Carl Ritter
(D) Immanuel Kant

123. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Humanistic geography often employs qualitative methods like phenomenology and hermeneutics.
Reason (R) : The focus of humanistic geography is on understanding subjective human experience, meanings, and values, which are not easily captured by quantitative techniques.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.

(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-3, R-1, S-4

194. The contributions of ancient Indian scholars to geography are best characterized as being part of which tradition?
(A) Administrative and military cartography.
(B) Cosmographical and philosophical inquiry.
(C) Quantitative spatial modeling.
(D) Field-based empirical research.

195. The primary focus of the 'area studies' or 'regional' tradition is on:
(A) Analysis
(B) Synthesis
(C) Prediction
(D) Modeling

196. Consider the following statements regarding Feminist geography:
Statement I : Feminist geographers argue that space is not neutral but is gendered.
Statement II : They study how spatial arrangements reflect and reinforce societal norms about gender.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

197. Which of the following does NOT fit into the 'man-environment relationship' tradition?
(A) Environmental determinism
(B) Possibilism
(C) Cultural ecology
(D) Locational analysis

198. The main objective of a positivist geographer is to:
(A) Achieve an empathetic understanding of human experience.
(B) Develop verifiable theories and laws explaining spatial phenomena.
(C) Critique the power structures embedded in geographical knowledge.
(D) Describe the unique character of a particular region.

199. Which of the following pairs is incorrectly matched?
(A) Varenius - Geographia Generalis
(B) Humboldt - Kosmos
(C) Ritter - The Nature of Geography
(D) Hartshorne - Areal Differentiation

200. The concept of 'paradigm shift' suggests that scientific progress occurs through:
(A) A steady accumulation of facts.
(B) Gradual refinement of theories.
(C) Revolutionary upheavals in worldview.
(D) Consensus of senior scholars.

201. The philosophical roots of Humanism in geography can be traced to:
(A) Logical Positivism
(B) Marxism
(C) Phenomenology and Existentialism
(D) Social Darwinism

202. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The Schaefer-Hartshorne debate represents a critical moment in 20th-century geography.
Reason (R) : It crystallized the conflict between the traditional, descriptive, ideographic view of geography and the emerging call for a more scientific, theoretical, nomothetic approach.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

203. Which of the following is the best example of a study in systematic geography?
(A) The geography of the Amazon Basin.
(B) A global study of the processes of desertification.
(C) The historical evolution of the city of Rome.
(D) A cultural geography of the Scottish Highlands.

204. The contemporary trend in Indian geography focusing on 'cartography' emphasizes:
(A) The historical study of ancient maps.

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132. The legacy of ancient Greek geography is LEAST associated with which of the following?
(A) Attempts to measure the Earth's circumference.
(B) The concept of climatic zones (klimata).
(C) The development of latitude and longitude.
(D) The rejection of mathematics in favor of pure description.

133. Which of the following statements correctly characterizes Structuralism in geography?
(A) It emphasizes human agency and free will in creating landscapes.
(B) It argues that observable spatial patterns are the product of deeper, underlying social or economic structures.
(C) Its primary methodology is the analysis of individual perceptions and mental maps.
(D) It seeks to establish universal laws through statistical testing and verification.

134. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Richard Hartshorne's 'The Nature of Geography' was a monumental effort to define the scope and method of the discipline.
Reason (R) : He argued strongly for a unified geography centered on the concept of 'areal differentiation', solidifying the ideographic tradition.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

135. The 'qualitative vs. quantitative' dualism refers to a debate over:
(A) The type of phenomena to study.
(B) The type of data and methods of analysis to use.
(C) The geographical scale of the study.
(D) The ultimate purpose of geographical research.

136. All of the following are central tenets of feminist geography EXCEPT:
(A) Making women's geographical experiences visible.
(B) Examining how gender relations are constituted in and through space.
(C) Challenging the supposed objectivity and universality of mainstream geographical knowledge.
(D) Arguing for the biological determinism of gender roles in society.

NODIA

137. Which of the following best represents an ideographic study?
(A) A statistical model predicting urban growth in Southeast Asia.
(B) A detailed monograph on the historical geography of the Nile Valley.
(C) A general theory of industrial location.
(D) A mathematical analysis of river network patterns.

138. Consider the following statements:
1. The Earth Science tradition is one of the oldest in geography.
2. The Man-environment relationship tradition includes perspectives like determinism and possibilism.
3. The Area studies tradition is essentially nomothetic in its approach.
4. The Spatial analysis tradition gained prominence with the Quantitative Revolution.

Which of the statements given above are correct?
(A) 1, 2 and 4 only
(B) 1, 2 and 3 only
(C) 2, 3 and 4 only
(D) 1, 3 and 4 only

139. The most significant and lasting contribution of Arab geographers during the Middle Ages was:
(A) The invention of the concept of paradigm shifts.
(B) The preservation, synthesis, and expansion of Greek and Roman geographical knowledge.
(C) The development of humanistic geography.
(D) The initiation of the dualism between physical and human geography.

140. A geographer arguing that the layout of a factory floor is designed by management to maximize control and surveillance over workers

(C) A is true but R is false.
(D) A is false but R is true.

124. The 'spatial analysis' tradition in geography is most concerned with which of the following questions?
(A) What is the unique character of this place?
(B) How have humans modified this environment?
(C) What is the locational pattern of this phenomenon and what process explains it?
(D) How has this landscape evolved over geological time?

125. The shift from explaining human geography through environmental factors (determinism) to emphasizing human choice and agency (possibilism) represents a significant change within which major geographic tradition?
(A) Earth Science tradition
(B) Man-environment relationship tradition
(C) Area studies tradition
(D) Spatial analysis tradition

126. Match List I with List II and select the correct answer using the codes given below.
List I:(Concept)
P. Deconstruction
Q. Areal Differentiation
R. Mental Maps
S. Class Struggle
List II:(Associated Perspective)
1. Behaviouralism
2. Structuralism (Marxist)
3. Postmodernism
4. Regional Geography (Hartshorne)
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-3, R-1, S-4

127. Which of the following is the most accurate description of Bernhardus Varenius's 'Geographia Generalis'?
(A) It was a detailed regional description of the Netherlands.
(B) It dealt with universal laws and principles affecting the Earth as a whole.
(C) It was a critique of the geographical works of the Greeks.
(D) It focused on the human and cultural aspects of geography.

128. What is the fundamental difference between Positivism and Humanism in geography?
(A) Positivism uses maps, while Humanism uses texts.
(B) Positivism seeks objective laws, while Humanism explores subjective experience.
(C) Positivism studies physical geography, while Humanism studies human geography.
(D) Positivism is a modern approach, while Humanism is an ancient one.

129. Consider the following pairs of geographers and their key ideas:
1. Ritter : Teleological approach
2. Humboldt : Inductive method
3. Schaefer : Nomothetic geography
4. Hartshorne : Spatial analysis
Which of the pairs given above are correctly matched?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 1, 3 and 4
(D) 2, 3 and 4

130. A geographer who studies the city as a text that can be "read" and interpreted in multiple ways, with no single correct meaning, is most likely influenced by:
(A) Positivism
(B) Postmodernism
(C) Behaviouralism
(D) Structuralism

131. Consider the following statements regarding geographical methods:
Statement I : The ideographic method focuses on formulating general theories applicable to all places.
Statement II : The nomothetic method focuses on the detailed study of the unique characteristics of a single place.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

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ideographic approaches to analytical, model-based, and nomothetic approaches.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

150. Which of the following is NOT associated with Postmodernism in geography?
(A) Deconstruction
(B) Skepticism towards meta-narratives
(C) Search for universal truth
(D) Focus on 'otherness' and difference

151. Which of the following geographers is most closely associated with the concept of "areal differentiation" as the core of geography?
(A) Carl Ritter
(B) Fred K. Schaefer
(C) Alexander von Humboldt
(D) Richard Hartshorne

152. Match List I with List II and select the correct answer using the codes given below.
List I:(Term)
P. Nomothetic
Q. Ideographic
R. Chorological
S. Teleological
List II:(Meaning)
1. Pertaining to the study of purpose or design in nature
2. Pertaining to the study of spatial distribution
3. Pertaining to the study of unique and particular phenomena
4. Pertaining to the formulation of general laws
Codes:
(A) P-4, Q-3, R-2, S-1
(B) P-3, Q-4, R-1, S-2
(C) P-4, Q-2, R-3, S-1
(D) P-1, Q-3, R-2, S-4

153. A geographer analyzing satellite imagery to monitor deforestation over time is working within which major geographic tradition?
(A) Man-environment relationship
(B) Area studies
(C) Earth Science
(D) Spatial analysis

154. What is the central argument of Behaviouralism in geography?
(A) Human behaviour is determined by deep economic structures.
(B) Human behaviour is a direct and rational response to the objective physical environment.
(C) Human spatial behaviour is mediated through cognitive processes and the perceived environment.
(D) Human behaviour can only be understood through empathetic and subjective interpretation.

155. Which of the following statements about the contributions of ancient scholars is incorrect?
(A) Greek scholars laid the philosophical and mathematical foundations of geography.
(B) Roman scholars applied geography for practical administrative and military purposes.
(C) Arab scholars preserved and advanced geographical knowledge during the medieval period.
(D) Chinese scholars were primarily focused on developing abstract dualisms like ideographic vs. nomothetic.

156. The critique that geography has historically been a discipline of the powerful, reflecting a white, male, Eurocentric worldview, is most strongly articulated by which perspectives?
(A) Positivism and Behaviouralism
(B) Feminism and Postmodernism
(C) Earth Science and Spatial Analysis
(D) Humanism and Structuralism

157. Consider the following statements regarding the physical vs. human dualism in geography:
Statement I : The dualism of physical versus human geography is a recent development, emerging only in the 21st century.
Statement II : This dualism can be traced back to the early development of the discipline, distinguishing between the study of the Earth's natural phenomena and human activities on it.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.

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is employing a line of reasoning most consistent with:
(A) Humanism
(B) Structuralism
(C) Positivism
(D) Behaviouralism

141. The primary aim of Positivism in geography is to:
(A) Understand the unique essence of a place.
(B) Explain and predict spatial patterns using scientific laws.
(C) Deconstruct geographical texts to reveal hidden meanings.
(D) Appreciate the aesthetic beauty of landscapes.

142. Consider the following statements regarding the founders of modern geography:
Statement I : Carl Ritter's work was characterized by a strong teleological perspective.
Statement II : Alexander von Humboldt's work was characterized by an empirical, inductive, and comparative methodology.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

143. The rejection of "meta-narratives" or grand, all-encompassing theories is a key feature of:
(A) Positivism
(B) Structuralism
(C) Postmodernism
(D) Behaviouralism

144. Which of the following schools of thought would most likely use methods like psychoanalysis of texts, discourse analysis, and deconstruction?
(A) Positivism
(B) Postmodernism
(C) Earth Science Tradition
(D) Behaviouralism

145. Consider the following statements about the founders of modern geography:
1. Humboldt emphasized a systematic approach, seeking connections between phenomena.
2. Ritter emphasized a regional approach, with a teleological and historical perspective.
3. Both were German scholars working in the early 19th century.
4. Both relied heavily on empirical observation, though their philosophical interpretations differed.
5. Humboldt wrote 'Kosmos' while Ritter wrote 'Erdkunde'.

Which of the statements given above are correct?
(A) 1, 2 and 5 only
(B) 3, 4 and 5 only
(C) 1, 2, 3 and 4 only
(D) 1, 2, 3, 4 and 5

146. A study focusing on the 'sense of place' and the lived experience of inhabitants in a particular community is an example of which geographical approach?
(A) Positivist
(B) Humanistic
(C) Structuralist
(D) Spatial analytic

147. The dualism of 'systematic versus regional' geography is a tension between:
(A) Studying the physical world versus the human world.
(B) Using quantitative versus qualitative methods.
(C) A topical, law-seeking approach versus a holistic, place-based approach.
(D) A historical perspective versus a contemporary perspective.

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148. The "Darwinian" influence on geography in the 19th and early 20th centuries primarily strengthened the ideology of:
(A) Possibilism
(B) Humanism
(C) Environmental Determinism
(D) Structuralism

149. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The Quantitative Revolution represented a major paradigm shift in geography.
Reason (R) : It involved a fundamental change in methodology, from descriptive and

urban decay differently. This approach blends elements from which two perspectives?
(A) Positivism and Earth Science
(B) Structuralism and Humanism
(C) Behaviouralism and Postmodernism
(D) Feminism and Positivism

167. The term "Paradigm" in the context of geographical thought refers to:
(A) A specific dualism, such as physical vs human.
(B) A universally accepted set of concepts, theories, and methods that define a scientific discipline at a particular time.
(C) The contributions of a single influential geographer.
(D) A branch of geography, such as cartography or geomorphology.

168. Varenius's division of geography into general and special is the historical antecedent to the modern dualism of:
(A) Physical vs. Human
(B) Qualitative vs. Quantitative
(C) Systematic vs. Regional
(D) Ideographic vs. Nomothetic

169. Consider the following statements about geographical perspectives:
1. Behaviouralism is interested in the subjective world of the decision-maker.
2. Positivism assumes an objective world that can be modeled.
3. Humanism is concerned with meaning, value, and lived experience.
4. Structuralism posits that human agency is heavily constrained by unseen forces.
5. Postmodernism questions the validity of all grand theoretical claims.

Which of the statements given above are correct?
(A) 1, 2 and 3 only
(B) 3, 4 and 5 only
(C) 1, 2, 4 and 5 only
(D) 1, 2, 3, 4 and 5

170. Which of the following is an example of a 'thematic contribution' in contemporary Indian geography?
(A) A new satellite imagery processing algorithm.
(B) A comprehensive study of urbanization patterns in the Gangetic plain.
(C) A new curriculum for teaching geography in schools.
(D) The digitization of historical maps of India.

171. Consider the following statements regarding the spatial analysis tradition:
Statement I : The spatial analysis tradition in geography emphasizes geometry, location, and distance.
Statement II : This tradition is fundamentally ideographic, focusing on the uniqueness of each spatial pattern.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

172. The most fundamental critique offered by feminist geography concerns the discipline's historical:
(A) Over-reliance on quantitative methods.
(B) Neglect of physical geography.
(C) Androcentric or male-centered bias.
(D) Focus on regional studies.

173. The work of which scholar represents the culmination of classical German geography, emphasizing a teleological and historical approach in his 'Erdkunde'?
(A) Alexander von Humboldt
(B) Immanuel Kant
(C) Carl Ritter
(D) Fred K. Schaefer

174. A study that deconstructs colonial-era maps to show how they constructed a particular vision of the 'Orient' for European audiences is a classic example of:
(A) Positivist cartography
(B) Behaviouralist analysis
(C) Humanist geography
(D) Postmodernist critique

175. Match List I with List II and select the correct answer using the codes given below.
List I:(Geographer)
P. Kant
Q. Varenius
R. Hartshorne

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S. Schaefer

List II:(Key Contribution)

1. Critique of exceptionalism
2. Areal differentiation
3. Dualism of general vs. special geography
4. Geography as a chorological science (philosophical basis)

Codes:

(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-2, S-1
(C) P-4, Q-2, R-3, S-1
(D) P-2, Q-3, R-1, S-4

176. The concept of a 'paradigm shift' implies a change that is:

(A) Gradual and incremental
(B) Minor and methodological
(C) Revolutionary and fundamental
(D) Predictable and cyclical

177. The main difference between the ideographic and nomothetic approaches is their goal. The goal of the ideographic approach is _____, while the goal of the nomothetic approach is _____.

(A) description; generalization
(B) explanation; prediction
(C) quantification; qualification
(D) synthesis; analysis

178. The impact of Darwin's theory on geography did NOT include:

(A) Providing a scientific basis for environmental determinism.
(B) Introducing concepts of struggle and adaptation into social studies.
(C) Bolstering the subfield of biogeography through evolutionary frameworks.
(D) Leading directly to the emergence of humanistic geographical approaches.

179. Consider the following traditions in geography:

1. Earth Science
2. Man-environment relationship
3. Area studies
4. Spatial analysis

Which of these traditions was most invigorated and transformed by the Quantitative Revolution?

(A) Earth Science
(B) Man-environment relationship
(C) Area studies
(D) Spatial analysis

180. Which school of thought would argue that to understand a city's social geography, one must first understand the "mode of production" and the inherent conflicts between capital and labor?

(A) Behaviouralism
(B) Marxist Structuralism
(C) Humanism
(D) Positivism

181. Consider the following statements regarding classical geographical knowledge:

Statement I : The works of Greek and Roman scholars were lost during the European Middle Ages and had no influence on Arab geographers.

Statement II : Arab scholars played a crucial role in translating, preserving, and building upon the geographical knowledge of the classical Greek and Roman periods.

Which of the following is correct?

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

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182. A geographer using questionnaires and statistical regression to test a hypothesis about shopping behavior is most likely working within the _____ paradigm.

(A) Humanist
(B) Postmodernist
(C) Positivist
(D) Structuralist

183. Which of the following statements about Richard Hartshorne is incorrect?

(A) He wrote the influential book 'The Nature of Geography'.
(B) He argued that geography's core task is 'areal differentiation'.
(C) He was a strong advocate for a nomothetic, law-seeking geography.
(D) He viewed geography as an ideographic discipline.

184. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.

Assertion (A) : The rise of Behaviouralism was

a response to the limitations of Positivism.
Reason (R) : Positivism's models of human behaviour were seen as overly simplistic, ignoring the complex cognitive processes that influence human decision-making.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

185. The dualism of 'physical vs. human geography' is a separation based on:
(A) Methodology
(B) Time period
(C) Subject matter
(D) Philosophical approach

186. Which perspective would be most interested in how the design of public spaces (like parks and squares) can either include or exclude certain groups, such as the homeless or teenagers?
(A) Postmodernism or Feminism
(B) Positivism
(C) Earth Science Tradition
(D) Behaviouralism

187. "Geographia Generalis" is a seminal work by:
(A) Immanuel Kant
(B) Bernhardus Varenius
(C) Carl Ritter
(D) Richard Hartshorne

188. Consider the following statements about the Postmodern perspective in geography:
1. An emphasis on creating a single, unifying theory of space.
2. A skepticism towards 'meta-narratives' or grand theories.
3. A focus on 'difference', 'otherness', and marginalized voices.
4. An acceptance of multiple readings and interpretations of landscapes.
5. A strong belief in objective, value-free scientific research.

Which of the statements given above are correct?
(A) 1, 2 and 3 only
(B) 2, 3 and 4 only
(C) 1, 4 and 5 only
(D) 2, 3, 4 and 5

189. The 'chorological' concept of geography, advocated by Kant and Hartshorne, defines geography by its focus on:
(A) The study of causal processes over time.
(B) The study of spatial relationships and distributions.
(C) The study of human-environment interactions.
(D) The study of universal laws of nature.

190. The work of Alexander von Humboldt can be characterized as:
(A) Deductive and teleological
(B) Inductive and empirical
(C) Ideographic and regional
(D) Abstract and philosophical

191. A study of the unique combination of physical and human elements that give a particular region its distinctive character is an example of:
(A) Systematic geography
(B) Spatial analysis
(C) Regional geography
(D) Behavioural geography

192. Which two schools of thought are most directly concerned with human consciousness, perception, and decision-making?
(A) Positivism and Structuralism
(B) Behaviouralism and Humanism
(C) Feminism and Postmodernism
(D) Earth Science and Area Studies

193. Match List I with List II and select the correct answer using the codes given below.
List I:(School)
P. Positivism
Q. Behaviouralism
R. Humanism
S. Structuralism
List II:(Question)
1. What is the lived experience and emotional attachment to this place?
2. How does the capitalist system produce this uneven urban development?
3. Is there a statistically significant correlation between distance and interaction?
4. What is the 'mental map' that guides a person's journey to work?
Codes:
(A) P-1, Q-2, R-3, S-4

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(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

158. The philosophical perspective that emphasizes lived experience, intentionality, and the meaning of 'place' and 'home' is:
(A) Positivism
(B) Structuralism
(C) Humanism
(D) Behaviouralism

159. Consider the following assertions about the Schaefer-Hartshorne debate:
1. It was a debate about the fundamental nature and methodology of geography.
2. Hartshorne championed geography as an ideographic discipline focused on unique regions.
3. Schaefer argued that geography should seek to formulate scientific laws, like other sciences.
4. The debate is often seen as a turning point leading towards the Quantitative Revolution.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 3 and 4 only
(C) 1, 2 and 3 only
(D) 1, 2, 3 and 4

160. Which of the following would be the LEAST likely topic of study for a geographer influenced by the Positivist paradigm?
(A) Modeling the diffusion of an innovation across a region.
(B) The poetic experience of walking through a forest.
(C) Statistically analyzing the factors influencing industrial location.
(D) Creating a predictive model of urban traffic flow.

161. 'Kosmos', the magnum opus of Alexander von Humboldt, is best described as:
(A) A regional geography of South America.
(B) A proposal for a new system of map projections.
(C) A grand, holistic synthesis of the physical universe.
(D) A teleological argument for God's design in nature.

162. The contemporary trend of 'methodological contributions' in Indian geography primarily focuses on:
(A) The development and application of new tools and techniques like GIS, remote sensing, and statistical methods to study Indian geographical issues.
(B) The rediscovery of ancient texts.
(C) The translation of foreign geographical works into Indian languages.
(D) Philosophical debates on the definition of 'India'.

163. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : In the dualism of systematic versus regional geography, systematic geography is nomothetic in its orientation.
Reason (R) : Systematic geography studies a specific class of phenomena to identify general processes and laws, irrespective of regional boundaries.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

164. The school of thought that critiques both Positivism and Humanism for ignoring the deep, unseen forces (like capitalism) that constrain human agency and produce spatial inequality is:
(A) Behaviouralism
(B) Structuralism
(C) Postmodernism
(D) Feminism

165. The concept that human action is not determined by the environment but that the environment offers a range of possibilities from which humans may choose is known as:
(A) Environmental Determinism
(B) Paradigm Shift
(C) Possibilism
(D) Spatial Analysis

166. A geographer is researching how different social classes in a city experience and perceive

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(B) The philosophical meaning of maps.
(C) The use of GIS and Remote Sensing for mapping and analysis.
(D) The artistic and aesthetic qualities of map design.

205. Consider the following statements regarding geographical thought:
1. The Darwinian theory strengthened the ideas of environmental determinism.
2. Immanuel Kant provided a philosophical place for geography as a chorological science.
3. Varenius established the early dualism of general versus special geography.
4. The Schaefer-Hartshorne debate was about quantitative versus qualitative methods.

Which of the statements given above are correct?
(A) 1, 2 and 3 only
(B) 2, 3 and 4 only
(C) 1, 3 and 4 only
(D) 1, 2 and 4 only

206. 'Deconstruction' is a key methodological tool for which geographical perspective?
(A) Positivism
(B) Behaviouralism
(C) Humanism
(D) Postmodernism

207. The fundamental belief that human behavior is a product of cognitive processing of information from the environment is central to:
(A) Structuralism
(B) Behaviouralism
(C) Possibilism
(D) Determinism

208. Consider the following statements regarding the founders of modern geography:
Statement I : Alexander von Humboldt and Carl Ritter had very similar philosophical approaches to geography.
Statement II : Humboldt's approach was inductive and comparative, while Ritter's was deductive and teleological.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

209. The primary contribution of the Roman Empire to the development of geography was its:
(A) Advanced philosophical speculation.
(B) Mathematical measurement of the Earth.
(C) Practical application in mapping for administration and conquest.
(D) Focus on the man-environment relationship.

210. Which dualism in geography is concerned with the split between studying the natural world and studying human societies?
(A) Regional vs. Systematic
(B) Physical vs. Human
(C) Qualitative vs. Quantitative
(D) Ideographic vs. Nomothetic

211. Which of the following statements about Positivism is INCORRECT?
(A) It relies on the scientific method.
(B) It seeks to identify universal laws.
(C) It values subjective interpretation.
(D) It forms the basis of quantification.

212. Match List I with List II and select the correct answer using the codes given below.
List I:(Author)
P. Varenius
Q. Humboldt
R. Ritter
S. Hartshorne
List II:(Work/Concept)
1. Erdkunde
2. Kosmos
3. The Nature of Geography
4. Geographia Generalis
Codes:
(A) P-4, Q-2, R-1, S-3
(B) P-4, Q-1, R-2, S-3
(C) P-3, Q-2, R-1, S-4
(D) P-1, Q-4, R-2, S-3

213. The idea that "space is gendered" is a central tenet of:
(A) Behaviouralism
(B) Structuralism
(C) Feminism
(D) Positivism

214. If a geographer argues that the distribution of poverty in a city is not a result of individual choices but is determined by the logic of

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commanders. Ptolemy's 'Geographia' was another landmark contribution, which, despite inaccuracies in Earth's size, established principles of map-making, including the use of latitude and longitude, and dominated geographical understanding in Europe for over a millennium. The Roman focus was less on mathematical theory and more on the practical application of geography for governance and control.

Based on the above source, attempt the following five questions.

251. According to the passage, what was a primary motivation for the geographical work undertaken by the Romans?
(A) A pursuit of pure philosophical understanding of the cosmos.
(B) The practical requirements of managing a large empire.
(C) The desire to disprove earlier Greek theories about the Earth.
(D) The goal of creating a perfectly accurate global map for exploration.

252. Which of the following contributions is specifically attributed to Greek scholars rather than Roman ones in the passage?
(A) Establishing the concept of a spherical Earth and its climatic zones.
(B) Creating an encyclopedic description of the known world for statesmen.
(C) Using geography primarily for military and administrative purposes.
(D) Developing a system of latitude and longitude that was entirely accurate.

253. The passage implies a key distinction between Greek and Roman geography. What is this distinction?
(A) Greeks focused on cartography while Romans focused on physical geography.
(B) Roman geographers completely rejected the work of earlier Greek thinkers.
(C) Greeks were more theoretical and mathematical, while Romans were more descriptive and practical.
(D) Greek geography was state-funded, whereas Roman geography was privately sponsored.

254. Ptolemy's 'Geographia' is described as a landmark contribution primarily because it:
(A) provided the first accurate calculation of the Earth's circumference.
(B) offered a mythological explanation for the world's creation.
(C) was a descriptive account intended solely for military commanders.
(D) established foundational principles for map-making using a coordinate system.

255. The work of Strabo, as described in the passage, can be best characterized as:
(A) a mathematical treatise on planetary motion.
(B) a theoretical framework for climatic zones.
(C) a comprehensive, descriptive regional geography.
(D) a critique of Ptolemy's cartographic methods.

Direction : Please read the following source carefully.

Following the classical period, the "Dark Ages" in Europe saw a decline in scientific geographical inquiry. However, this intellectual tradition was preserved and significantly advanced by Arab, Chinese, and Indian scholars. Arab geographers, building upon Greek and Indian knowledge, made substantial contributions, particularly in mathematical, astronomical, and regional geography. Scholars like Al-Beruni conducted detailed studies of India, showcasing a keen understanding of cultural and physical geography, while Al-Idrisi produced a comprehensive world map and geographical text for King Roger II of Sicily, blending descriptive information with cartographic sophistication. In the East, Chinese civilization had a long and independent history of geographical scholarship. Their contributions were notable in the field of cartography, with a focus on administrative and topographical mapping that was remarkably precise for its time. Chinese exploration, though not always as widely documented as European voyages, also expanded the geographical horizons. Meanwhile, ancient Indian scholars contributed through a different lens, often embedding geographical knowledge within cosmological, philosophical, and religious texts. Their works contain concepts of the universe, descriptions of lands and rivers (like in the Puranas), and early ideas about the relationship between humans and their environment, though

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focus.

224. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : Alexander von Humboldt is considered a key founder of modern geography.
Reason (R) : His work 'Kosmos' was a monumental attempt to provide a holistic view of the universe, based on empirical observation and the interconnectedness of phenomena.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

225. A geographer studying how urban planning in colonial cities was designed to segregate populations and facilitate control is most likely adopting a perspective influenced by:
(A) Positivism
(B) Behaviouralism
(C) Structuralism or Postmodernism
(D) Earth Science

226. The key difference between Behaviouralism and Humanism is that:
(A) Behaviouralism is scientific and seeks models, while Humanism is interpretative and seeks understanding.
(B) Behaviouralism studies groups, while Humanism only studies individuals.
(C) Behaviouralism uses qualitative data, while Humanism uses quantitative data.
(D) Behaviouralism is older than Humanism.

227. A study titled "Geomorphology of the Himalayas" would fall squarely within which geographic tradition?
(A) Man-environment relationship
(B) Area studies
(C) Earth Science
(D) Spatial analysis

228. Consider the following statements about geographical dualisms:
1. Physical vs Human: A division of subject matter.
2. Regional vs Systematic: A division of methodological approach.
3. Ideographic vs Nomothetic: A division of philosophical goals.
4. These dualisms represent rigid, unbridgeable divides in the discipline.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 1, 2 and 3 only
(C) 2 and 3 only
(D) 1, 2, 3 and 4

229. The teleological viewpoint is most famously associated with:
(A) Alexander von Humboldt
(B) Carl Ritter
(C) Fred K. Schaefer
(D) Richard Hartshorne

230. A feminist geographer would most likely be interested in which of the following research questions?
(A) What is the rate of soil erosion on this hillslope?
(B) How does fear of crime in public spaces differ by gender and shape mobility patterns?
(C) What is the optimal location for a new distribution center?
(D) What is the unique cultural heritage of this village?

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231. Consider the following statements regarding the quantitative revolution:
Statement I : The quantitative revolution sought to make geography more scientific and law-seeking.
Statement II : This revolution was philosophically aligned with positivism.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

232. The approach that seeks to understand the world through the subjective experiences of individuals is:
(A) Positivism
(B) Structuralism
(C) Humanism
(D) Determinism

233. The scholar who criticized geography's 'exceptionalism' and argued for a scientific, law-seeking approach was:
(A) Richard Hartshorne
(B) Immanuel Kant
(C) Carl Ritter
(D) Fred K. Schaefer

234. The tradition of 'spatial analysis' is LEAST concerned with:
(A) Geometric patterns
(B) Locational theories
(C) Network analysis
(D) Lived experience of place

235. The contributions of Arab scholars were particularly significant in the field of:
(A) Environmental determinism
(B) Regional synthesis
(C) Mathematical and astronomical geography
(D) Postmodern critique

236. The term 'paradigm shift' in geography is most strongly associated with the:
(A) Rise of regional geography
(B) Humboldt-Ritter era works
(C) Quantitative Revolution shift
(D) Emergence of feminist thought

237. Which of the following correctly pairs a geographical perspective with its primary focus?
(A) Positivism - Subjective meaning
(B) Structuralism - Individual perception
(C) Behaviouralism - Cognitive processes
(D) Humanism - Universal laws

238. Consider the following statements about early geographers:
1. Varenius set up the dualism of general and special geography.
2. Kant located geography within a framework of sciences as a chorological discipline.
3. Humboldt was an advocate of systematic, empirical study.
4. Ritter was an advocate of a regional, teleological approach.
5. Hartshorne and Schaefer were Greek scholars.

Which of the statements given above are correct?
(A) 1, 2, 3, and 4 only
(B) 2, 3, 4, and 5 only
(C) 1, 3, and 5 only
(D) 1, 2, 3, 4, and 5

239. The most significant and lasting contribution of Greek scholars to geography was their:
(A) Practical road maps.
(B) Application of philosophy and mathematics to understand the Earth.
(C) Detailed description of human cultures.
(D) Development of the concept of possibilism.

240. The 'man-environment relationship' tradition explores all of the following concepts EXCEPT:
(A) Determinism
(B) Possibilism
(C) Adaptation
(D) Geometrical network analysis

241. A geographer who believes that observable spatial patterns are merely surface manifestations of deeper economic structures is a proponent of:
(A) Humanism
(B) Structuralism
(C) Behaviouralism
(D) Postmodernism

242. Consider the following statements regarding Postmodernism:
Statement I : Postmodernism embraces the idea of a single, objective truth.
Statement II : It celebrates multiplicity, difference, and the deconstruction of grand narratives.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

243. The primary difference between Alexander von Humboldt and Carl Ritter's methodologies was:
(A) Humboldt focused on physical geography, Ritter on human.
(B) Humboldt was inductive, Ritter was deductive/teleological.
(C) Humboldt was an armchair geographer, Ritter was an explorer.
(D) Humboldt wrote 'Geographia Generalis', Ritter wrote 'Kosmos'.

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244. The focus of the Hartshorne-Schaefer debate was primarily on:
(A) The merits of physical versus human geography.
(B) The role of God in shaping the Earth.
(C) The question of whether geography should be a descriptive (ideographic) or a law-seeking (nomothetic) science.
(D) The use of maps versus statistics in geographical research.

245. Match List I with List II and select the correct answer using the codes given below.
List I:(Dualism)
P. Physical vs. Human
Q. Regional vs. Systematic
R. Qualitative vs. Quantitative
S. Ideographic vs. Nomothetic
List II:(Dichotomy)
1. Unique vs. General
2. Interpretation vs. Measurement
3. Nature vs. Society
4. Place vs. Topic
Codes:
(A) P-3, Q-4, R-2, S-1
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-2, S-4
(D) P-4, Q-3, R-1, S-2

246. Which school of thought brought concepts like 'mental maps' and the 'behavioural environment' to the forefront of geographical analysis?
(A) Positivism
(B) Behaviouralism
(C) Structuralism
(D) Humanism

247. The introduction of Darwinian theory into geography provided a conceptual framework for:
(A) The quantitative analysis of spatial patterns.
(B) The study of human societies in terms of adaptation and environmental influence.
(C) The critique of all grand theories.
(D) The study of subjective human experiences.

248. The study of the unique character of a place, resulting from a combination of its natural and human elements, is the central concern of:
(A) The spatial analysis tradition.
(B) The area studies tradition.
(C) The Earth science tradition.
(D) The behavioural tradition.

249. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes given below.
Assertion (A) : The perspective of Humanism in geography prioritizes human agency, consciousness, and creativity.
Reason (R) : It emerged as a reaction against the perceived mechanistic and deterministic models of positivism and behaviouralism.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A false but R is true.

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250. Which of the following is NOT one of the major geographic traditions?
(A) Earth Science
(B) Man-environment relationship
(C) Historical geography
(D) Spatial analysis

Direction : Please read the following source carefully.

The foundations of Western geographical thought are deeply rooted in the intellectual traditions of ancient Greece and Rome. Greek scholars were pioneers in moving from mythological explanations of the world to a more scientific and philosophical inquiry. They were the first to establish a spherical Earth concept and attempted its measurement, with Eratosthenes providing a remarkably accurate calculation of the Earth's circumference. The Greeks also conceptualized the world into climatic zones, or 'klimata', based on the angle of the sun's rays. Thinkers like Anaximander are credited with creating one of the earliest world maps. Roman geographers, while inheriting much from the Greeks, were more pragmatic and descriptive in their approach, driven by the administrative, military, and commercial needs of their expanding empire. Strabo's 'Geographica' stands as a monumental encyclopedic work, providing a detailed descriptive account of the known world, intended for statesmen and

and neglected human factors.
(B) It relied too heavily on Darwin's theory of evolution.
(C) It ignored the importance of historical context in regional studies.
(D) It treated geography as an exceptional, descriptive field rather than a law-seeking science.

274. The term 'nomothetic', as advocated by Schaefer, suggests that geography should be primarily concerned with:
(A) establishing general laws and theories.
(B) describing the specific character of individual places.
(C) understanding historical sequences of events.
(D) appreciating the subjective experience of place.

275. The Schaefer-Hartshorne debate is presented in the passage as a pivotal moment that directly led to the:
(A) establishment of environmental determinism.
(B) decline of regional geography altogether.
(C) onset of the quantitative revolution in geography.
(D) rise of humanistic perspectives in geography.

Direction : Please read the following source carefully.

Contemporary trends in Indian geography reflect a dynamic evolution from its colonial and post-colonial antecedents. Post-independence, the discipline moved away from a purely descriptive, gazetteer-style approach towards more analytical and problem-oriented research. A significant trend has been the methodological modernization of the field. This includes the widespread adoption of quantitative techniques, statistical analysis, and, more recently, the integration of remote sensing and Geographic Information Systems (GIS) into geographical research. Thematic contributions have become increasingly specialized, with Indian geographers making notable contributions in areas such as urban geography, agricultural geography, population studies, and environmental management. Cartography in India has also seen a major transformation, shifting from traditional manual map-making to sophisticated digital cartography and thematic mapping, which are crucial for national planning and resource management. Methodologically, there is a growing, though still developing, engagement with geographical theories and philosophies from the West, such as behaviouralism and humanism, alongside an effort to develop indigenous concepts and approaches that are better suited to the socio-economic realities of India. The overall trend is towards a more applied, socially relevant, and methodologically robust discipline that addresses the country's pressing developmental and environmental challenges.

Based on the above source, attempt the following five questions.

276. What major methodological shift in contemporary Indian geography is highlighted in the passage?
(A) The widespread adoption of quantitative methods, GIS, and remote sensing.
(B) A complete rejection of fieldwork in favour of theoretical work.
(C) A return to the traditional gazetteer-style descriptive geography.
(D) A primary focus on historical cartography and ancient texts.

277. According to the passage, the focus of cartography in contemporary India has shifted towards:
(A) manual map-making for educational purposes.
(B) reproducing historical maps from the colonial era.
(C) purely artistic and aesthetic representations of landscapes.
(D) digital techniques and the creation of thematic maps for planning.

278. The passage suggests that post-independence Indian geography has become more:
(A) isolated from global geographical discourse.
(B) analytical, applied, and problem-oriented.
(C) focused on purely philosophical and abstract concepts.
(D) descriptive and less concerned with analysis.

279. Which of the following is mentioned as a thematic area where Indian geographers have made notable contributions?

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often expressed in a non-empirical, metaphysical framework.

Based on the above source, attempt the following five questions.

256. According to the passage, what was a significant area of contribution for Chinese geographers?
(A) Developing a system of climatic zones based on solar angles.
(B) Creating precise administrative and topographical maps.
(C) Translating Greek texts into Arabic for wider dissemination.
(D) Writing encyclopedic regional geographies for European kings.

257. The passage suggests that the contributions of ancient Indian scholars to geography were often:
(A) focused primarily on mathematical calculations of the Earth's size.
(B) driven by the military needs of a large, expanding empire.
(C) based on extensive empirical fieldwork and exploration.
(D) integrated into cosmological and philosophical writings.

258. Which scholar is mentioned as having produced a significant geographical work that integrated descriptive text with advanced cartography for a European monarch?
(A) Al-Idrisi
(B) Al-Beruni
(C) Ptolemy
(D) Anaximander

259. What role did Arab geographers play during the period described as the "Dark Ages" in Europe?
(A) They rejected all classical Greek geographical knowledge as outdated.
(B) They focused exclusively on mythological explanations of the world.
(C) They preserved and advanced scientific geographical traditions.
(D) They limited their studies to the geography of the Arabian Peninsula.

260. A key difference highlighted between the geographical contributions of Al-Beruni and Al-Idrisi is that:
(A) Al-Beruni focused on a detailed study of a specific region (India), while Al-Idrisi created a world map.
(B) Al-Beruni was a cartographer, whereas Al-Idrisi was solely a descriptive writer.
(C) Al-Idrisi's work was metaphysical, while Al-Beruni's was strictly mathematical.
(D) Al-Beruni worked for a European king, while Al-Idrisi worked independently.

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Direction : Please read the following source carefully.

The early modern period witnessed the re-emergence of scientific geography in Europe, with Bernhardus Varenius and Immanuel Kant making pivotal contributions to its philosophical and structural foundations. Varenius, in his work 'Geographia Generalis' (1650), was instrumental in laying the groundwork for the academic discipline. He is credited with establishing a fundamental dualism in geography by bifurcating the field into 'general' and 'special' geography. General geography, for Varenius, corresponded to what we now call systematic geography, focusing on universal laws and phenomena that affect the Earth as a whole, such as planetary motion, climate, and hydrography. Special geography, on the other hand, was akin to modern regional geography, concerned with the detailed description of particular places and regions, examining their unique characteristics. Over a century later, the philosopher Immanuel Kant further solidified geography's place within the broader system of knowledge. Kant did not conduct geographical fieldwork himself, but his lectures on physical geography were immensely popular. He conceptualized geography as a 'chorological' science—a discipline that studies phenomena that exist together in space. He contrasted this with history, which he defined as a 'chronological' science that studies phenomena that follow one another in time. This philosophical positioning provided geography with a distinct and legitimate intellectual domain.

Based on the above source, attempt the following five questions.

261. What is the central contribution of Bernhardus Varenius to geography as described in the passage?
(A) He conducted the first major fieldwork expeditions of the modern era.

capitalist accumulation, they are adopting which perspective?
(A) Humanist
(B) Behaviouralist
(C) Structuralist
(D) Positivist

215. The 'Earth Science tradition' in geography would most likely focus on which of the following topics?
(A) The spatial patterns of voting behavior.
(B) The role of mental maps in navigation.
(C) The processes of weathering and erosion.
(D) The meaning of 'home' in different cultures.

216. Consider the following statements:
1. 'Nomothetic' refers to a law-seeking approach.
2. 'Ideographic' refers to a descriptive, particularizing approach.
3. The spatial analysis tradition is primarily nomothetic.
4. The area studies tradition is primarily ideographic.
5. Schaefer advocated for an ideographic approach.

Which of the statements given above are correct?
(A) 1, 2, 3, and 4 only
(B) 2, 3, 4, and 5 only
(C) 1, 3, and 5 only
(D) 1, 2, 3, 4, and 5

217. The shift in geography from a focus on the unique characteristics of regions to a focus on discovering universal spatial laws is an example of:
(A) A dualistic conflict
(B) A paradigm shift
(C) A thematic contribution
(D) A teleological development

218. The main focus of ancient Chinese geography was on:
(A) Philosophical debates about the origin of the Earth.
(B) Descriptive inventories and mapping for administrative control.
(C) The development of environmental determinist theories.
(D) Subjective and emotional responses to landscape.

219. Consider the following statements regarding Humanistic geography:
Statement I : Humanistic geography arose in opposition to the perceived mechanistic and dehumanizing nature of positivist geography.
Statement II : Humanistic geographers are primarily interested in creating predictive mathematical models of human behavior.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

220. The concept of 'areal differentiation', central to the work of Richard Hartshorne, is the guiding principle for which major geographic tradition?
(A) Earth Science
(B) Man-environment relationship
(C) Area studies
(D) Spatial analysis

221. Which perspective would be most likely to analyze a geographical text or map not for its factual accuracy, but for the ideologies and power structures it represents?
(A) Positivism
(B) Postmodernism
(C) Behaviouralism
(D) Earth Science

222. Darwin's 'On the Origin of Species' had a major impact on geographical thought by:
(A) Proving the Earth was spherical.
(B) Providing a model for competition and adaptation that was applied to human societies and their environments.
(C) Introducing quantitative methods to geography.
(D) Leading to the development of humanistic approaches.

223. The dualism of qualitative vs. quantitative methods centers on the choice between:
(A) Studying physical vs. human topics.
(B) Studying unique regions vs. general processes.
(C) Using numerical data and statistical analysis vs. using descriptive data and interpretative analysis.
(D) Adopting a historical vs. a contemporary

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by mathematical laws alone.
(D) empirical observation was the only valid method for geographical inquiry.

268. Humboldt's work 'Kosmos' is characterized in the passage as an attempt to:
(A) present a holistic perspective on the interconnectedness of natural phenomena.
(B) provide a regional geography of Europe for military use.
(C) argue for divine intervention in the course of human history.
(D) create a new system of latitude and longitude for cartography.

269. Which statement best captures the anthropocentric focus of Carl Ritter's 'Erdkunde'?
(A) It emphasized the study of physical processes independent of human activity.
(B) It sought to establish universal laws of nature through systematic measurement.
(C) It viewed the Earth's geography primarily in relation to its influence on human history.
(D) It catalogued the flora and fauna of South America in great detail.

270. The passage suggests that although both are considered founders of modern geography, Humboldt is more associated with _____ geography, while Ritter is more associated with _____ geography.
(A) human; physical
(B) historical; political
(C) qualitative; quantitative
(D) systematic; regional

Direction : Please read the following source carefully.

The trajectory of geographical thought in the late 19th and mid-20th centuries was significantly shaped by two major intellectual developments: the impact of Darwinian theory and the Schaefer-Hartshorne debate. The publication of Darwin's 'On the Origin of Species' provided a powerful new paradigm for understanding the relationship between organisms and their environment, which was readily adapted by geographers. This led to the rise of environmental determinism, a perspective that sought to explain human societies, cultures, and historical development as direct outcomes of the physical environment. By the mid-20th century, however, this approach was heavily criticized, leading to a profound disciplinary debate. Richard Hartshorne, in 'The Nature of Geography' (1939), defended the traditional view of geography as an 'ideographic' discipline concerned with 'areal differentiation'—the study and description of the unique character of places. Decades later, Fred K. Schaefer, in his posthumously published paper "Exceptionalism in Geography: A Methodological Examination" (1953), launched a stark critique of Hartshorne's position. Schaefer argued that geography should not be 'exceptional' among the sciences. Instead, it should be a 'nomothetic' science, seeking to formulate and test general laws governing the spatial distribution of phenomena, embracing a positivist and scientific approach akin to economics or physics. This debate was a catalyst for the quantitative revolution.

Based on the above source, attempt the following five questions.

271. The immediate impact of Darwinian theory on geographical thought, as described in the passage, was the promotion of which perspective?
(A) The idea of geography as a law-seeking spatial science.
(B) The defense of geography as a discipline focused on unique regions.
(C) The view that the physical environment dictates human development.
(D) The rejection of fieldwork in favor of philosophical inquiry.

272. Richard Hartshorne's concept of 'areal differentiation' aligns with the view that geography's primary goal is to:
(A) formulate universal laws of spatial distribution.
(B) study the unique and distinctive characteristics of particular regions.
(C) explain human culture as a product of environmental factors.
(D) use quantitative methods to predict spatial patterns.

273. What was Fred K. Schaefer's main criticism of the Hartshornian view of geography?
(A) It was too focused on mathematical models

NODIA

(B) He rejected all classical geographical knowledge in favour of new theories.
(C) He defined geography as a chorological science concerned with space.
(D) He proposed dividing geography into systematic (general) and regional (special) branches.

262. According to Immanuel Kant's perspective, geography is to space as history is to:
(A) philosophy.
(B) time.
(C) humanity.
(D) science.

263. The passage defines Varenius's concept of 'general geography' as the study of:
(A) the unique characteristics of a particular country.
(B) the description of specific places for administrative purposes.
(C) universal physical laws and phenomena affecting the entire Earth.
(D) the historical evolution of geographical features.

264. What does the term 'chorological science' imply about the nature of geography, according to Kant?
(A) It is primarily concerned with the chronological sequence of events.
(B) It should prioritize universal laws over the study of particular places.
(C) It is a branch of history that deals with the mapping of past events.
(D) Its main focus is the study of phenomena arranged and associated in space.

265. Based on the passage, one can infer that Varenius's 'special geography' is the conceptual forerunner of what modern sub-discipline?
(A) Regional Geography
(B) Geomorphology
(C) Climatology
(D) Quantitative Analysis

Direction : Please read the following source carefully.

The 19th century is often considered the classical modern period of geography, dominated by the monumental figures of Alexander von Humboldt and Carl Ritter. Both are regarded as co-founders of modern geography, yet they approached the subject with distinct methodologies and philosophies. Alexander von Humboldt was an explorer and a polymath whose approach was fundamentally empirical and observational. He travelled extensively, particularly in Latin America, collecting vast amounts of data on flora, fauna, climate, and geology. His magnum opus, 'Kosmos', sought to articulate a holistic view of the universe, demonstrating the interconnectedness of all natural phenomena. Humboldt emphasized systematic geography, seeking to identify causal relationships and general principles through meticulous measurement and comparison. In contrast, Carl Ritter was an academic who spent most of his life in a university setting. His major work, 'Erdkunde', was an extensive regional geography that aimed to show the relationship between the physical environment and human history. Ritter's approach was often teleological, suggesting a divine plan in the arrangement of Earth's features to facilitate human development. While Humboldt sought to understand nature as a unified whole, Ritter's focus was more anthropocentric, viewing geography as a means to understand God's plan for humanity.

Based on the above source, attempt the following five questions.

266. A key methodological difference between Humboldt and Ritter mentioned in the passage is that:
(A) Humboldt was a regional geographer, while Ritter was a systematic geographer.
(B) Humboldt relied on empirical fieldwork, whereas Ritter was primarily a university-based academic.
(C) Ritter rejected the idea of a human-environment relationship, which Humboldt championed.
(D) Humboldt's work was purely descriptive, while Ritter's was strictly analytical.

267. The term 'teleological', when used to describe Ritter's approach, implies that he believed:
(A) geographical features were randomly distributed without any purpose.
(B) the Earth's physical structure was designed with a specific purpose or plan for humanity.
(C) all natural phenomena could be explained

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(A) Extraterrestrial geography
(B) The geography of ancient mythology
(C) Urban and agricultural geography
(D) The history of European exploration

280. What does the passage indicate about the relationship between contemporary Indian geography and Western geographical theories?
(A) Indian geography has completely rejected all Western theories as irrelevant.
(B) There is no awareness of Western geographical philosophies in India.
(C) Indian geographers exclusively use Western theories without any adaptation.
(D) There is a growing engagement with Western theories alongside efforts to develop indigenous concepts.

Direction : Please read the following source carefully.

Geography as a discipline has historically been organized around several major intellectual traditions that define its scope and purpose. One of the oldest is the Earth Science tradition, which focuses on the study of the physical Earth, its systems, and processes. This tradition encompasses geomorphology, climatology, and biogeography, viewing geography as a natural science concerned with the planetary environment. A second, equally prominent tradition is the Man-Environment Relationship, which investigates the complex interactions between human societies and their physical settings. This tradition has been home to diverse and often conflicting perspectives, ranging from environmental determinism, which posits that the environment dictates human action, to possibilism and cultural ecology. A third major tradition is Area Studies, or regional studies. This approach is concerned with the synthesis of all physical and human phenomena within a specific area to understand its unique character or 'areal differentiation'. It emphasizes the particular over the general. Finally, the Spatial Analysis tradition, which gained significant momentum during the quantitative revolution, views geography's primary task as the analysis of the spatial distribution and arrangement of phenomena. It seeks to identify patterns, regularities, and geometric structures on the Earth's surface, often using mathematical models and statistical techniques to explain locational dynamics.

Based on the above source, attempt the following five questions.

281. Which geographical tradition is most concerned with the study of geomorphology and climatology?
(A) The Earth Science tradition.
(B) The Area Studies tradition.
(C) The Man-Environment Relationship tradition.
(D) The Spatial Analysis tradition.

282. The concept of 'areal differentiation', or understanding the unique character of a place, is the central focus of which tradition?
(A) Earth Science
(B) Area Studies
(C) Spatial Analysis
(D) Man-Environment Relationship

283. The use of mathematical models and statistical techniques to explain locational patterns is a hallmark of which tradition?
(A) Earth Science
(B) Spatial Analysis
(C) Area Studies
(D) Man-Environment Relationship

284. Perspectives such as environmental determinism and possibilism would be studied within the framework of which major tradition?
(A) The Man-Environment Relationship tradition.
(B) The Spatial Analysis tradition.
(C) The Earth Science tradition.
(D) The Cartographic tradition.

285. A geographer studying the geometric pattern of cities and their market areas would most likely be working within the:
(A) Earth Science tradition.
(B) Area Studies tradition.
(C) Spatial Analysis tradition.
(D) Man-Environment Relationship tradition.

Direction : Please read the following source carefully.

The history of geographical thought is characterized by a series of enduring dualisms, or tensions between competing approaches to the discipline. Perhaps the most fundamental is the

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these psychological lenses, geographers can explain why people choose specific locations based on their personal interpretations of space.

8. (B) Both A and R are true but R is not the correct explanation of A.
Alexander von Humboldt and Carl Ritter are rightfully celebrated as the founders of modern geography. While both utilized empirical observation, their philosophical frameworks differed significantly. Humboldt preferred inductive methods to find interconnectedness in nature, whereas Ritter used deductive, teleological reasoning. Although these different approaches are factually correct, the reason provided describes their methodological differences rather than explaining why they are considered the primary founders of the modern discipline.

9. (C) Mapping and documenting mathematical geography through extensive travel and astronomy.
During the medieval period, Arab scholars made vital contributions by preserving classical knowledge and advancing mathematical geography. Their work involved extensive travel, which allowed for precise documentation of various regions and people. By utilizing sophisticated astronomical tools, they improved map accuracy and calculated the Earth's dimensions more effectively. This tradition emphasized empirical data collection and practical navigation, bridging the gap between ancient Greek theories and the European Age of Discovery.

10. (A) A fundamental change in the basic concepts and experimental practices of a discipline.
A paradigm shift represents a revolutionary transformation in the theoretical framework and methodology of a scientific field. In geography, the most notable shift occurred during the Quantitative Revolution, when the discipline moved from descriptive regional studies to analytical, law-seeking spatial science. This involves a complete reevaluation of how knowledge is produced and validated. Such changes alter the fundamental questions geographers ask and the techniques they use for research.

11. (B) 1, 2 and 4 only
Geography is traditionally organized into major traditions that define its scope. The Earth Science tradition studies physical systems, while the man-environment tradition explores human-nature interactions. Spatial analysis focuses on geometric and locational properties. However, the area studies tradition is ideographic, meaning it describes unique places rather than seeking universal laws. Therefore, only the descriptions of the physical systems, human-environment interactions, and spatial analysis are correctly matched with their primary geographic goals.

12. (B) Practical applications for military campaigns, administration, and trade.
Roman geographical contributions were primarily utilitarian, focusing on the needs of a vast, expanding empire. Unlike the philosophical Greeks, Romans prioritized accurate mapping for administrative control, military movement, and efficient trade routes. Their work resulted in detailed road maps and regional inventories essential for governing conquered territories. This practical approach ensured that geographical knowledge served the state's strategic interests, emphasizing the functional aspects of space, distance, and resource management.

13. (C) The unique and particular characteristics of a region or place.
The ideographic approach focuses on the description of specific, unique phenomena rather than the formulation of general laws. In geography, this method is central to regional studies, where the goal is to understand the distinctive character of a particular area. It emphasizes the complex synthesis of physical and human factors that make a place one-of-a-kind. This perspective contrasts with the nomothetic approach, which seeks to establish universal principles.

14. (A) 3, 1, 4, 2
Geographical thought has evolved through several dominant schools of thought over time. Environmental determinism was prominent in the late nineteenth and early twentieth centuries. This was followed by the Quantitative Revolution and Positivism in the mid-twentieth century. Later, researchers introduced Behaviouralism to account for human cognition in decision-making.

NODIA

quantitative methods, seeks to establish general laws and theories that can be applied universally. A significant change in the dominant approach within a discipline is often termed a 'paradigm shift'. In geography, the move from the dominance of the ideographic, regional geography paradigm of the Hartshornian era to the nomothetic, spatial science paradigm following Schaefer's critique and the quantitative revolution is a classic example of such a shift. This involves a fundamental change in the core concepts, methods, and problems considered legitimate by the discipline's practitioners.

Based on the above source, attempt the following five questions.

291. A research project that uses statistical regression to analyze the relationship between income and distance from the city center is an example of which approach?
(A) A purely ideographic approach.
(B) A non-scientific approach.
(C) A quantitative approach.
(D) A qualitative approach.

292. The term 'paradigm shift' in the context of geography refers to:
(A) a fundamental change in the discipline's basic concepts and practices.
(B) a minor adjustment in a specific geographical theory.
(C) the simple replacement of one map projection with another.
(D) a gradual and slow evolution of ideas without major disruption.

293. Which of the following pairs correctly aligns a geographical approach with its corresponding goal?
(A) Nomothetic - Understanding unique characteristics.
(B) Ideographic - Establishing general laws.
(C) Quantitative - Providing descriptive richness.
(D) Nomothetic - Establishing general laws.

294. The passage identifies the shift from the dominance of regional geography to spatial science as a key 'paradigm shift'. This shift can also be described as a move from:
(A) nomothetic to ideographic approaches.
(B) ideographic to nomothetic approaches.
(C) quantitative to qualitative methods.
(D) physical to human geography.

295. A geographer conducting in-depth interviews to understand residents' sense of place and attachment to their neighborhood is employing:
(A) a nomothetic methodology.
(B) a quantitative research design.
(C) a qualitative and ideographic approach.
(D) a paradigm shift in practice.

Direction : Please read the following source carefully.

The latter half of the 20th century saw the emergence of several critical and reflexive perspectives in geography, challenging the dominance of positivism. Positivism, which underpinned the quantitative revolution, advocates for a scientific, objective approach to geography, seeking to identify universal laws of spatial organization. In response, Behaviouralism emerged, arguing that spatial patterns could not be understood by geometric laws alone; instead, it focused on the cognitive processes behind human spatial decision-making, such as mental maps and perceived environments. Taking the critique further, Humanism rejected the scientific model altogether. Humanistic geography places human experience, consciousness, values, and meaning at the center of inquiry, using qualitative methods to understand the 'sense of place' and the lived world. Structuralism, influenced by Marxist thought, offered another critique, arguing that the visible spatial patterns are the surface manifestations of deeper, unseen social and economic structures, such as capitalism, that shape society. Later, Feminism introduced a critical perspective that highlighted the patriarchal biases within the discipline, examining how gender relations shape and are shaped by space. Finally, Postmodernism challenged all grand theories or 'meta-narratives' (like Positivism or Marxism), emphasizing deconstruction, multiplicity of voices, and the relativity of knowledge, arguing that there is no single, objective truth about the world.

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adopt statistical techniques and mathematical models to identify spatial laws. By prioritizing objectivity and value-neutral research, positivism successfully shifted the discipline away from descriptive regional geography toward a more analytical and theoretical spatial science.

22. (B) Behaviouralism - Analyzes unseen economic structures that determine patterns.
Behaviouralism focuses on how human cognition and perception influence spatial choices, rather than analyzing unseen economic structures. The study of deep, underlying social or economic forces that determine spatial patterns is actually the core idea of structuralism. Behaviouralism was developed as a bridge between mechanistic positivism and subjective humanism, emphasizing that people make decisions based on their perceived environment. Therefore, the description provided for behaviouralism in the options is factually incorrect and belongs to another perspective.

23. (D) The study of a particular category of phenomena or a process as it occurs globally.
Systematic geography involves the study of specific topics or processes across different regions of the world. Instead of focusing on a single area, it examines universal patterns of phenomena like climate, population, or landforms. This topical approach aims to identify general principles and spatial laws that apply globally. It contrasts with regional geography, which synthesizes various elements within a specific place. Systematic studies allow geographers to understand broad distributions and the causal mechanisms behind them.

24. (B) P-4, Q-1, R-2, S-3
The history of geography is marked by various scholars and their defining concepts. Carl Ritter is known for his teleological view and his massive work, Erdkunde. Richard Hartshorne is most famous for defining geography through the concept of areal differentiation. Fred K. Schaefer advocated for spatial analysis and the search for scientific laws. Finally, Alexander von Humboldt used the comparative method in his masterpiece, Kosmos. Matching these geographers to their specific contributions clarifies their unique roles.

25. (C) Placed geography within a logical classification of sciences as a chorological discipline.
Immanuel Kant provided geography with a solid philosophical foundation by classifying it within a logical system of sciences. He argued that while history is a chronological science concerned with time, geography is a chorological science concerned with space. This distinction established geography as a unique field focused on the arrangement of phenomena across the Earth's surface. By formalizing this spatial perspective, Kant helped define the scope of the discipline for future researchers and scholars.

26. (B) 1, 3, 4 and 5 only
Geography is traditionally defined by four major traditions that provide a comprehensive framework for research. These include the Earth Science tradition, the man-environment relationship tradition, the area studies tradition, and the spatial analysis tradition. Each tradition emphasizes a different aspect of the discipline, ranging from physical processes and human-nature interactions to regional descriptions and geometric patterns. Historical analysis, while an important tool for geographers, is not typically listed as one of these four core recognized traditions.

27. (D) A search for a single, objective truth through scientific methods.
Postmodernism in geography is characterized by deep skepticism toward grand theories and the idea of a single, objective truth. Instead of seeking universal laws through scientific methods, it emphasizes that reality is socially constructed through language and discourse. This perspective values difference, otherness, and marginalized voices that are often ignored by traditional science. By deconstructing dominant narratives, postmodern geographers reveal how power and knowledge are intertwined, rejecting the positivist search for absolute, value-free certainty.

28. (B) Bernhardus Varenius
Bernhardus Varenius was a seventeenth-century scholar whose work, Geographia Generalis, became a foundational text in the history of geography. He is credited with establishing the crucial dualism between general and special geography. General geography focused on

NODIA

ANSWERS

1. (B) Greek scholars
Ancient Greek civilization is renowned for transforming geography into a scientific discipline. These scholars developed foundational concepts by utilizing mathematical and philosophical frameworks to describe the Earth. Their significant contributions include establishing the idea of a spherical Earth and creating early systems for climatic zones. By moving beyond myths, they laid the groundwork for systematic observation, cartography, and the analytical study of global physical patterns.

2. (A) The debate over whether to study the natural environment or human societies.
Geography faces a long-standing division between focusing on natural phenomena and social activities. This dualism examines whether the discipline should primarily investigate physical environments or human societies. It reflects the fundamental tension in organizing geographical knowledge. While physical geography focuses on landforms and climate, human geography analyzes social structures and cultural landscapes. Understanding this core debate is essential for grasping the diverse methodological approaches used.

3. (A) Both Statement I and Statement II are true.
Immanuel Kant played a pivotal role in the philosophical categorization of knowledge. He separated geography from history by defining it as a chorological science focused on space rather than time. His classification included systematic, historical, and geographical sciences to organize empirical reality. By emphasizing that geography explores phenomena existing together in space, Kant established a logical foundation that influenced generations of researchers seeking to define geographical boundaries.

4. (D) It identifies universal laws and spatial theories through empirical and verifiable data.
Positivism serves as a scientific framework within geography that prioritizes empirical evidence and quantitative verification. This approach seeks to identify universal laws and spatial theories by analyzing objective data. It rejects subjective interpretations in favor of standardized methodologies and statistical models. By focusing on verifiable information, positivism aims to create a value-neutral science that explains spatial patterns through rigorous testing and logical reasoning processes.

5. (A) P-4, Q-3, R-1, S-2
Geographical perspectives differ significantly in their central focuses and methodological foundations. Behaviouralism examines decision-making based on perception, while humanism explores individual subjective experiences. Structuralism analyzes unseen social structures like class conflict, and positivism seeks objective laws of spatial relations. These paradigms represent various ways geographers interpret reality, from human consciousness to systematic data analysis. This matching exercise highlights the theoretical diversity within the evolution of contemporary geographical thought.

6. (B) Spatial Analysis
The man-environment relationship tradition encompasses different philosophical viewpoints regarding how humans interact with nature. Environmental determinism, possibilism, and neo-determinism are the three primary perspectives within this specific geographical theme. Spatial analysis, however, focuses on geometric patterns and locational theories rather than the direct interaction between humans and their surroundings. It belongs to the tradition of spatial organization, prioritizing mathematical models over environmental or cultural influences.

7. (D) Behaviouralism
Behaviouralism in geography emphasizes the role of human cognition and perception in spatial decision-making. Researchers using this perspective analyze mental maps to understand how individuals navigate and interact with their environment. Unlike models that assume perfect rationality, behaviouralism accounts for subjective biases and perceived distances. By studying consumer shopping patterns through

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296. Which geographical perspective places the subjective human experience and 'sense of place' at the core of its inquiry?
(A) Positivism
(B) Structuralism
(C) Behaviouralism
(D) Humanism

297. A geographer arguing that the location of industries and slums in a city is determined by the underlying logic of the capitalist mode of production would be adopting which perspective?
(A) Structuralism
(B) Behaviouralism
(C) Postmodernism
(D) Humanism

298. The key difference between Positivism and Behaviouralism is that Behaviouralism:
(A) rejects all forms of scientific inquiry.
(B) focuses on the cognitive processes influencing spatial decisions.
(C) seeks to establish universal laws of geometry.
(D) emphasizes the role of gender in shaping space.

299. Which perspective is characterized by its skepticism towards 'meta-narratives' and its emphasis on deconstruction and the multiplicity of truths?
(A) Positivism
(B) Postmodernism
(C) Structuralism
(D) Feminism

300. The feminist perspective in geography is primarily concerned with:
(A) critiquing patriarchal biases and analyzing gendered spaces.
(B) creating more accurate mental maps of cities.
(C) identifying universal laws of spatial distribution.
(D) understanding the deep economic structures of society.

NODIA

Finally, Humanism emerged as a critique of these mechanistic models, emphasizing subjective lived experiences and human agency in the study of social and physical spaces.

15. (C) Statement I is true, but Statement II is false.
The debate between Fred K. Schaefer and Richard Hartshorne was a significant intellectual conflict in mid-twentieth-century geography. While the first statement correctly identifies the debate, the second statement reverses their positions. Schaefer was the one who advocated for a law-seeking, nomothetic approach to geography. Conversely, Hartshorne defended an exceptionalist, ideographic perspective that prioritized regional differentiation. This disagreement catalyzed the shift toward the Quantitative Revolution, fundamentally changing the methodology of the discipline.

16. (B) Ideographic vs. Nomothetic: The tension between studying unique cases and formulating general laws.
Geographical dualism involves competing perspectives on the nature and methodology of the discipline. The contrast between ideographic and nomothetic approaches highlights the tension between studying unique regions and seeking universal laws. This fundamental division influences how geographers collect data and interpret spatial patterns. While one side values the particularity of specific places, the other seeks to build broad theoretical models. This dualism remains a central theme in debates regarding the purpose of geographical research.

17. (B) Feminism
Feminism in geography critiques how traditional spatial organization and urban planning reflect male-centered biases. This perspective investigates how power structures and societal norms marginalize women's access to resources and mobility. By analyzing transport routes and employment sectors through this lens, researchers can expose gendered inequalities embedded in the landscape. This approach seeks to make women's experiences visible and challenges the androcentric assumptions that have historically dominated geographical inquiry and city development strategies.

18. (D) 1, 2, 3, 4 and 5
Modern geography was shaped by several influential figures and their unique philosophical contributions. Varenius introduced the dualism of general and special geography, while Humboldt and Ritter established the foundations for systematic and regional study. Hartshorne later popularized the concept of areal differentiation, defining geography as a chorological science. Finally, Schaefer challenged these descriptive traditions by advocating for a scientific, law-making approach. Together, these milestones represent the critical evolution of geographical theory and methodology.

19. (C) Philosophical cosmography and astronomy.
Ancient Indian scholars made substantial contributions to geography through their detailed study of cosmography and astronomy. Their work is found in classical texts like the Vedas and Puranas, which describe the universe and the Earth's place within it. These scholars developed rudimentary maps of the known world and used astronomical observations to understand celestial patterns. This tradition was deeply intertwined with philosophical and mythological interpretations, forming a unique perspective on the Earth's physical structure.

20. (D) It provided a scientific basis for determinism and viewing societies as organisms.
Darwin's theory of evolution significantly influenced late nineteenth-century geographical thought by providing a framework for environmental determinism. Geographers applied biological concepts like natural selection and adaptation to human societies, often viewing them as organisms competing for survival. This perspective suggested that physical environments directly dictate social development and cultural characteristics. It led to the belief that human history is a product of natural forces, establishing a rigid link between geography and the evolution of civilizations.

21. (A) Both A and R are true and R is the correct explanation of A.
Positivism became the philosophical cornerstone of the Quantitative Revolution in geography during the 1950s and 1960s. It emphasized that only knowledge based on empirical verification and the scientific method is valid. This provided the necessary foundation for geographers to

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collect and analyze data. Quantitative research relies on numerical data, statistical models, and mathematical testing to identify spatial patterns and laws. In contrast, qualitative research utilizes descriptive data, such as interviews or observations, to understand meanings and experiences. This division reflects different philosophies regarding how knowledge is generated. Most modern geographical studies now attempt to integrate both approaches to provide a more comprehensive analysis.

36. (D) Manifestations of class struggle and the global circulation of capital.
Structuralism in geography, heavily influenced by Marxist theory, looks beyond surface patterns to identify the underlying societal forces that shape space. A structuralist analysis of a city would focus on how the global capitalist economy and class struggle manifest in the urban landscape. This perspective argues that spatial arrangements are not accidental but are produced by economic structures and power relations. By examining these hidden mechanisms, geographers can explain uneven development and social inequality within different city zones.

37. (A) 3, 2, 4, 1
Arranging geographical works chronologically reveals the evolution of the discipline's core ideas. Bernhardus Varenius published Geographia Generalis in the seventeenth century, establishing the systematic-regional dualism. Alexander von Humboldt's Kosmos and Carl Ritter's Erdkunde were published in the mid-nineteenth century, marking the foundation of modern geography. Finally, Richard Hartshorne's The Nature of Geography appeared in 1939, formalizing the concept of areal differentiation. This sequence shows the progression from early dualisms to nineteenth-century foundations and twentieth-century theoretical synthesis.

38. (B) Geopolitics and environmental determinism
Darwin's theory of evolution provided a scientific framework that geographers adapted to study human societies and their environments. This influence led directly to the development of environmental determinism, which argued that the physical environment dictates human behavior and social development. Additionally, these biological concepts were applied to geopolitics, viewing states as organisms competing for space and resources. This perspective dominated the discipline in the late nineteenth century, establishing a rigid, naturalistic interpretation of human geography and political power.

39. (D) Cartography contributions
Contemporary Indian geography has seen a significant emphasis on cartography, particularly with the integration of modern technology. This trend involves creating and analyzing maps that depict specific data sets, such as population density or environmental variables. By utilizing Geographic Information Systems and remote sensing, geographers can produce highly accurate thematic maps. These cartographic tools are essential for planning, resource management, and visualizing complex spatial information, representing a vital technical contribution to the discipline's development within the Indian context.

40. (A) Carl Ritter
Carl Ritter was a nineteenth-century German geographer known for his massive work, Erdkunde, and his teleological perspective. He believed the Earth was divinely designed to facilitate human development and that its physical features shaped the course of history. Ritter's approach was essentially regional and deductive, contrasting with the inductive methods of his contemporary, Alexander von Humboldt. His work emphasized the relationship between the natural environment and human civilizations, establishing a foundation for modern regional and human geography.

41. (B) P-4, Q-1, R-3, S-2
Different geographical perspectives utilize distinct methodologies to investigate spatial phenomena. Positivism relies on statistical modeling and hypothesis testing to find universal laws. Humanism employs qualitative methods like in-depth interviews and phenomenology to explore lived experiences. Behaviouralism uses questionnaires to analyze perception and cognitive processes. Finally, structuralism focuses on the analysis of underlying economic and social forces that shape patterns. Matching these perspectives with their methods highlights the diverse analytical tools available to modern geographers for studying the world.

NODIA

universal principles that apply to the Earth as a whole, while special geography was concerned with the detailed description of specific regions. This division anticipated the modern distinction between systematic and regional geography, influencing many later geographers, including Immanuel Kant.

29. (A) Both Statement I and Statement II are true.
Geography employs two distinct methodological approaches to study the world. The nomothetic approach focuses on identifying general laws and universal principles that explain spatial patterns and processes. In contrast, the ideographic approach emphasizes the unique characteristics and detailed description of particular places or regions. Both methods are essential for a complete understanding of the discipline, as one provides a theoretical framework for generalization while the other captures the complexity and distinctiveness of geographical reality.

30. (D) They developed advanced cartography and maintained records for administration.
Ancient Chinese scholars made significant contributions to geography, particularly through their excellence in cartography and administrative record-keeping. Their work involved creating detailed maps of territories and maintaining comprehensive inventories of resources for effective governance. This practical tradition focused on regional descriptions and precise surveying techniques. By documenting physical and human features across their vast empire, they established an advanced system of geographical information that was essential for political stability and resource management during various dynastic periods.

31. (C) 1, 2 and 3 only
Humanism emerged in geography as a critical response to the mechanistic and dehumanizing models of positivism. It places high value on subjective human experiences, intentions, and meanings rather than objective data. Methodologically, it often utilizes qualitative approaches like phenomenology to explore how individuals perceive their environment. However, humanism does not seek to formulate universal laws of spatial behavior, as it prioritizes individual agency and unique perspectives over the search for generalized, law-like predictions of human activity.

32. (B) The in-depth study of regional physical and human characteristics.
The area studies tradition, also known as regional geography, focuses on the holistic description and analysis of specific places. It involves a detailed synthesis of various factors, including landforms, climate, culture, and economic activities, to understand the unique character of a region. This approach is essentially ideographic, emphasizing what makes one area different from another. Unlike spatial analysis, which seeks general laws, area studies prioritize the complex integration of features that define a particular geographic unit.

33. (B) An analysis of the formation and distribution of glacial moraines.
The Earth Science tradition in geography focuses on the planet's physical systems and natural processes. An analysis of the formation and distribution of glacial moraines is a perfect example, as it involves geomorphology and the study of physical landforms. This tradition prioritizes understanding the Earth's natural environment, including its lithosphere, atmosphere, hydrosphere, and biosphere. Other options, like voting patterns or colonialism, belong to human or historical geography, which are distinct from the Earth Science perspective.

34. (A) Both A and R are true and R is the correct explanation of A.
The debate between Fred K. Schaefer and Richard Hartshorne was a defining moment for mid-twentieth-century geographical thought. Hartshorne championed the ideographic tradition, viewing geography as a science of areal differentiation focused on describing unique regions. Schaefer challenged this by arguing for a nomothetic approach, where geography would function as a scientific discipline seeking universal spatial laws. This conflict highlighted the fundamental methodological divide in the field and served as a major catalyst for the upcoming Quantitative Revolution.

35. (C) The methodological and analytical approach used in research.
The dualism of qualitative versus quantitative geography concerns the specific methods used to

NODIA

dualism between physical geography and human geography. This divide separates the study of the natural environment and its processes from the study of human populations, societies, and cultures in their spatial context. While many argue for an integrated approach, the two branches have often developed with separate methodologies and theoretical frameworks, leading to a fragmented disciplinary identity. Another long-standing dualism is that of regional versus systematic geography. Systematic (or general) geography focuses on a specific category of phenomena (e.g., climate, agriculture, urbanism) and analyzes its distribution and principles across the globe. It seeks to establish general laws or patterns. In contrast, regional (or special) geography takes a specific area or region as its object of study and aims to provide a comprehensive synthesis of all the geographical phenomena, both physical and human, that co-exist there. The systematic approach provides the building blocks of knowledge, while the regional approach uses these blocks to construct a holistic understanding of a particular place. This dualism reflects a tension between the search for general principles and the appreciation of unique, complex realities.

Based on the above source, attempt the following five questions.

286. According to the passage, the dualism between physical and human geography is characterized by:
(A) a complete and permanent separation with no interaction.
(B) the universal agreement that physical geography is more important.
(C) the recent emergence of this divide in the 21st century.
(D) development along often separate methodological and theoretical lines.

287. A geographer writing a book titled "The Global Patterns of Wheat Cultivation" would be practicing which type of geography?
(A) Regional geography
(B) Historical geography
(C) Systematic geography
(D) Physical geography exclusively

288. The primary goal of regional geography, as described in the passage, is to:
(A) establish universal laws that apply to all regions equally.
(B) provide a holistic synthesis of various phenomena within a specific area.
(C) focus on a single physical feature, such as a mountain range, across continents.
(D) separate the study of human activities from the physical environment.

289. The passage presents the relationship between systematic and regional geography as one where:
(A) systematic geography is considered an outdated approach.
(B) regional geography provides the specific data for systematic analysis.
(C) they are conflicting approaches that cannot be reconciled.
(D) systematic knowledge provides the components for regional synthesis.

290. Which of the following best describes the core tension in the regional vs. systematic dualism?
(A) The divergence between seeking general patterns and describing unique places.
(B) The conflict between studying the past versus the present.
(C) The opposition between qualitative and quantitative data.
(D) The separation of mapping from theoretical analysis.

Direction : Please read the following source carefully.

Furthering the discussion of dualisms in geography, the 20th century saw the intensification of the qualitative versus quantitative debate. Qualitative approaches emphasize descriptive richness, interpretation, and understanding the unique characteristics of places and human experiences, often using methods like interviews and ethnography. In contrast, the quantitative approach, which championed the 'quantitative revolution', focuses on measurement, statistical analysis, and mathematical modeling to test hypotheses and formulate general laws. This is closely linked to the ideographic versus nomothetic dualism. An ideographic approach, aligned with traditional regional geography and qualitative methods, aims to understand the unique, the particular, and the specific. A nomothetic approach, aligned with spatial science and

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42. (B) It argues that spatial decisions are based on the objective environment, not the perceived one. Behaviouralism in geography is defined by the idea that human decisions are based on the perceived environment rather than the objective physical reality. It argues that individuals filter information through their cognitive processes, creating mental maps that guide their spatial choices. This perspective emerged as a critique of the perfectly rational 'economic man' assumed in positivism. Therefore, claiming that decisions are based solely on the objective environment is an inaccurate description of behaviouralism, as it ignores the central role of perception.

43. (C) Feminism
A study exploring how patriarchal norms influence women's mobility and access to resources is a clear application of feminist geography. This perspective examines how gender relations are constructed through space and how societal power structures limit women's experiences. By focusing on rural India, the research highlights the gendered nature of environments and challenges androcentric biases in traditional geographical analysis. Feminism aims to make women's lives visible and addresses the inequalities embedded in both social systems and the physical landscape.

44. (B) 2, 3 and 5 only
Alexander von Humboldt was a central figure in modern geography, known for his emphasis on systematic study and the interconnectedness of natural phenomena. His inductive and comparative approach in Kosmos sought to unify diverse scientific observations. Humboldt also introduced innovative cartographic tools, such as isotherms, to represent temperature distributions. Unlike Carl Ritter, he did not advocate for a teleological view of nature. Therefore, statements focusing on his systematic perspective, his masterpiece Kosmos, and his use of isotherms are the correct ones.

45. (C) The way phenomena are arranged in space.
Chorology, a term derived from the Greek word for 'place' or 'space', defines geography as the science of spatial arrangement. As championed by Immanuel Kant and Richard Hartshorne, this concept emphasizes that geographers study how diverse phenomena exist together in specific locations. It focuses on the causal relationships between different features within a given area, leading to the concept of areal differentiation. This spatial perspective distinguishes geography from history, which is primarily concerned with chronological sequences over time.

46. (B) Postmodernism
Postmodernism in geography is characterized by its deep skepticism toward the idea of a single, objective, and universally valid truth. Postmodernists argue that knowledge, including cartography, is socially constructed and reflects the power relations and biases of those who produce it. They would critique any claim that a map represents a perfect reality, instead viewing it as a particular 'reading' of the world. This perspective emphasizes that multiple interpretations and voices are necessary to understand the complex nature of space.

47. (A) Both A and R are true and R is the correct explanation of A.
Bernhardus Varenius made a lasting impact on geographical thought by dividing the discipline into general and special geography. His work, Geographia Generalis, provided the first systematic framework for studying universal laws affecting the Earth. Simultaneously, his focus on special geography highlighted the importance of detailed regional descriptions. This fundamental division directly laid the groundwork for the modern dualism between systematic and regional geography. It allowed the discipline to develop both as a law-seeking science and a place-based study.

48. (C) The geometric patterns of cities and the principles of location.
The spatial analysis tradition in geography is primarily concerned with the geometric properties, locational patterns, and spatial organization of phenomena. It utilizes mathematical models and quantitative techniques to identify the principles that govern how cities, industries, and networks are arranged in space. This tradition became dominant during the Quantitative Revolution, shifting the focus away from unique regional descriptions toward universal spatial laws. It seeks to explain and predict distributions through the analysis of distance, connectivity, and spatial interaction.

NODIA

100. (D) Challenge and correct the male-centric bias within the discipline of geography.
Feminist geography is a critical perspective that aims to expose and challenge the historical androcentric, or male-centered, bias within the discipline. It argues that traditional geographical knowledge has often ignored the spatial experiences and roles of women. By making these experiences visible, feminist geographers provide a more comprehensive and accurate understanding of how gender relations shape and are shaped by space. This approach investigates how societal power structures and norms influence mobility and access to resources, aiming to create a more inclusive and socially just geographical discourse.

101. (C) Bernhardus Varenius
Bernhardus Varenius, a seventeenth-century scholar, is famous for establishing the dualism between general and special geography in his work, Geographia Generalis. General geography focused on universal laws and physical principles that applied globally, while special geography was concerned with the detailed description of particular regions. This distinction was revolutionary as it provided a framework for both systematic and regional studies. Varenius's work remained a standard textbook for decades and was instrumental in shaping the philosophical foundations of modern geography, influencing later figures like Immanuel Kant and Carl Ritter.

102. (C) Statement I is false, but Statement II is true.
Postmodernism in geography represents a major critique of the idea that there is a single, objective reality. The first statement is false because postmodernists explicitly reject the search for absolute truths through traditional scientific methods. Instead, as the second statement correctly notes, they emphasize that knowledge is socially constructed through language and discourse. This perspective celebrates a multiplicity of voices and interpretations, particularly those that have been marginalized. By deconstructing meta-narratives, postmodern geographers reveal how power and knowledge are linked, arguing for a more diverse and critical understanding of space.

103. (B) Positivism
The Quantitative Revolution that transformed geography in the 1950s and 1960s was philosophically rooted in positivism. This approach emphasizes that only knowledge derived through the scientific method and empirical verification is valid. Positivist geographers sought to make the discipline more objective and analytical by using mathematical models and statistical techniques to identify universal spatial laws. By prioritizing value-free research and the search for regularities, positivism provided the theoretical foundation for the shift from descriptive regional geography to a more predictive and law-seeking spatial science.

104. (A) Both A and R are true and R is the correct explanation of A.
Ancient Greek scholars laid the foundational pillars of the Western geographical tradition by moving beyond myths to adopt scientific methods. They utilized mathematical and observational techniques to calculate the Earth's circumference and describe its shape. Scholars like Eratosthenes and Ptolemy developed systems of latitude and longitude, establishing the principles of cartography. This intellectual shift toward empirical and logical reasoning allowed them to identify climatic zones and organize geographical information systematically. Their work provided a permanent framework for studying the Earth, influencing all subsequent developments in the discipline of geography.

105. (C) A study of the geometric principles of central place theory.
The man-environment relationship tradition in geography explores the dynamic interactions between human societies and their natural surroundings. It includes themes like environmental influence on human character, human transformation of landscapes through irrigation, and biological adaptation to different environments. However, studying the geometric principles of central place theory is a focus of the spatial analysis tradition. Central place theory examines the location, size, and function of settlements using abstract mathematical models rather than the direct relationship between humans and the environment. Therefore, it does not fit within this specific tradition.

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the mid-nineteenth century, contributing to the establishment of modern geography. Finally, Richard Hartshorne refined the discipline's scope in the mid-twentieth century. Following this sequence highlights the progression of geographical ideas from foundational dualisms to professional maturation.

56. (C) Regional vs. Systematic Geography
The dualism of ideographic versus nomothetic geography can be closely paralleled with the regional versus systematic divide. An ideographic approach, like regional geography, focuses on the detailed description of unique, individual places. Conversely, a nomothetic approach, similar to systematic geography, seeks to identify general laws and universal principles that apply to specific phenomena globally. Both pairings reflect the fundamental tension between studying the particular and seeking the general, a central theme that has shaped the methodology and organization of the discipline.

57. (A) Both Statement I and Statement II are true.
Feminist geography is a critical perspective that addresses the historical male-centered bias in geographical research. It argues that traditional studies have often ignored the experiences and roles of women. By making women's spatialities visible, feminist geographers aim to provide a more inclusive and accurate understanding of the world. This perspective investigates how gender relations are constructed in and through space, challenging androcentric assumptions and exploring how societal norms and power structures influence the daily lives and mobility of individuals.

58. (D) Arab scholars
During the European Middle Ages, Arab scholars made significant contributions by preserving and advancing the geographical knowledge of classical antiquity. They excelled in mathematical geography, astronomy, and navigation, which allowed them to improve map accuracy and calculate the Earth's dimensions. Through extensive travel and scholarship, they documented diverse regions and built upon Greek and Roman foundations. This intellectual tradition was crucial for maintaining the scientific continuity of geography during a period when it was largely neglected in Western Europe, eventually influencing the Renaissance.

59. (B) P-2, Q-3, R-1, S-4
Matching famous geographers with their key works or defining statements illustrates the history of geographical ideas. Alexander von Humboldt wrote the holistic work Kosmos, while Carl Ritter is known for his massive Erdkunde. Fred K. Schaefer famously criticized the ideographic tradition by stating that 'exceptionalism is a crime', advocating for a law-seeking science. Bernhardus Varenius authored Geographia Generalis, establishing the fundamental dualism between general and special geography. These contributions represent pivotal moments that have shaped the scope and methodology of the modern discipline.

60. (B) The development of new field survey techniques and analytical models.
Methodological contributions in contemporary Indian geography refer to the advancement of techniques used for spatial research and analysis. This involves developing new field survey methods, as well as sophisticated analytical models for interpreting geographical data. By integrating modern tools like Remote Sensing and GIS with traditional techniques, geographers can better address complex developmental and environmental issues. These improvements in methodology ensure that the discipline remains relevant and capable of providing precise, data-driven solutions to contemporary geographical challenges in the Indian context.

61. (C) Humanism
Humanism emerged in geography as a strong reaction against the mechanistic models and dehumanizing tendencies of positivism and early behaviouralism. It emphasizes the importance of human agency, consciousness, and the subjective meanings people attach to their environment. Humanist geographers argue that spatial patterns cannot be fully understood through objective laws alone, as individual intentions and values play a critical role. By focusing on lived experience and the 'sense of place', humanism reintroduced the human element into a discipline that had become increasingly focused on abstract data.

NODIA

49. (B) The best way to organize geographical knowledge and research.
The dualism of regional versus systematic geography represents a debate over the most effective framework for organizing geographical study. Systematic geography focuses on topical themes like climate or population across the globe to identify general laws. In contrast, regional geography provides a holistic synthesis of various elements within a specific place to understand its unique character. This debate centers on whether the discipline should be structured by individual phenomena or by geographic units, reflecting a core organizational challenge in geographical research.

50. (C) Postmodernism
Postmodernism is a philosophical perspective that rejects the idea of a single, objective reality and views grand theories as instruments of power. It argues that knowledge is socially constructed and that different groups have their own valid perspectives. In geography, postmodernism emphasizes the importance of language, discourse, and marginalized voices in shaping our understanding of space. By deconstructing meta-narratives, postmodernists reveal the hidden biases and political agendas that often underpin traditional scientific and geographical knowledge.

51. (D) 1, 2, 3 and 4
Geography is defined by several major dualisms that reflect its complex nature. Physical versus human geography focuses on the subject matter, while systematic versus regional geography concerns organization and method. The ideographic versus nomothetic debate addresses the ultimate goals of inquiry, either describing unique cases or seeking general laws. Finally, qualitative versus quantitative geography represents the dualism of analytical techniques. Together, these divisions highlight the diverse philosophical, methodological, and topical frameworks that characterize the evolution of modern geographical thought.

52. (B) Development of an empirical and philosophical framework for studying the Earth.
Ancient Greek scholars are credited with establishing the foundational framework for geography as a scientific and philosophical discipline. They moved beyond mythological explanations to develop empirical methods for observing the Earth's size, shape, and features. Their contributions included pioneering mathematical geography, identifying climatic zones, and speculating on the Earth's origin. This intellectual tradition prioritized logical reasoning and systematic observation, providing the essential groundwork for all subsequent Western geographical thought and the eventual development of the discipline as a formal science.

53. (C) A chorological science concerned with areal differentiation.
In his influential work, The Nature of Geography, Richard Hartshorne argued that geography is a chorological science. He believed that the discipline's primary task is areal differentiation, which involves studying the unique synthesis of physical and human features that define specific places. This perspective emphasized the ideographic tradition, focusing on the character of regions rather than the formulation of universal laws. Hartshorne's work established a dominant paradigm in mid-twentieth-century American geography, focusing on the distinctiveness of individual spatial units.

54. (C) Focus on individual creativity and subjective interpretation.
Positivism in geography is characterized by its emphasis on objectivity, value-neutrality, and the use of the scientific method. Its primary goal is to formulate theories and universal laws based on empirical data and hypothesis testing. Therefore, focusing on individual creativity and subjective interpretation is not a characteristic of the positivist approach. Positivists reject personal biases and qualitative meanings in favor of standardized, verifiable information. This mechanistic perspective aims to create a more rigorous and predictive science of spatial patterns and processes.

55. (A) 3, 1, 4, 2
The history of geographical thought is marked by several key scholars whose work appeared in a specific chronological order. Bernhardus Varenius established early dualisms in the seventeenth century. Immanuel Kant provided a philosophical foundation in the late eighteenth century. Carl Ritter was a dominant figure in

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laws and universal theories that explain spatial phenomena. This method prioritizes generalization and the search for patterns that apply across different places and times. It relies heavily on quantitative techniques, statistical analysis, and mathematical modeling to find regularities in data. The nomothetic approach stands in contrast to the ideographic approach, which focuses on describing unique characteristics. It is central to systematic geography and spatial analysis, aiming to build a predictive and theoretical science.

69. (C) Statement I is false, but Statement II is true.
Behaviouralism in geography represents a shift toward understanding the role of human cognition in spatial decision-making. The first statement is false because behaviouralism specifically rejects the idea that the objective environment is the sole determinant of human action. Instead, it introduced the concept of the 'behavioural environment' or 'perceived reality', as stated in the second statement. This perspective argues that people act based on their mental interpretations of the world, making it a bridge between objective models and subjective human experiences in geographical analysis.

70. (C) Eastern vs. Western geography
Geography is traditionally shaped by several major dualisms that represent fundamental divisions in subject matter, methodology, and philosophy. These include the physical versus human, regional versus systematic, and ideographic versus nomothetic dualisms. Each reflects a core debate within the discipline's evolution. However, 'Eastern vs. Western geography' is not recognized as a major theoretical dualism in the same way. While geographical knowledge has different cultural origins, the discipline's primary intellectual divisions are defined by internal methodological tensions rather than broad geographic or cultural dichotomies.

71. (B) Humanism
Humanism in geography focuses on the subjective lived experience of individuals and the meanings they attach to specific places. A geographer using phenomenology would explore deep, personal connections like the 'sense of place' that residents feel for their neighborhoods. This approach prioritizes human consciousness and intentionality over objective data or universal laws. By investigating these emotional bonds, humanism seeks to understand how people perceive their world and create their own identities within it. It highlights the human element that quantitative spatial analysis often ignores.

72. (D) 1, 2, 3 and 4
The history of geography is built upon different methodological and philosophical foundations. Alexander von Humboldt utilized inductive reasoning to find interconnectedness in nature, while Carl Ritter often relied on a deductive, teleological framework. In the twentieth century, Richard Hartshorne championed the ideographic approach, focusing on the uniqueness of regions through areal differentiation. Conversely, Fred Schaefer advocated for a nomothetic approach, pushing geography to become a law-seeking science. All four statements correctly match these influential geographers with their primary methodological stances, showing the diversity of geographical thought.

NODIA

73. (B) Deconstruct existing geographical knowledge to reveal its hidden biases and power relations.
Postmodernism in geography is a critical perspective that challenges the idea of objective truth and universal theories. Its primary goal is to deconstruct existing knowledge to expose the hidden biases, power structures, and marginalized voices within the discipline. Postmodernists argue that geography, including maps and texts, is a social construct that reflects specific interests. By questioning these 'meta-narratives', they aim to provide a more nuanced understanding of space that recognizes multiplicity and difference, rejecting the positivist search for absolute, value-free certainty in spatial science.

74. (A) Both A and R are true and R is the correct explanation of A.
Carl Ritter's geographical approach is famously described as teleological because he viewed the Earth as part of a divine plan. He believed that the physical features of continents were specifically designed by God to guide the development and history of human civilizations. This perspective influenced how he analyzed regional characteristics, as he sought to uncover the higher purpose behind natural arrangements.

62. (A) Both A and R are true and R is the correct explanation of A.
Darwin's theory of evolution had a profound and direct impact on the development of environmental determinism in geography. Geographers adopted biological concepts like the 'struggle for existence' and 'survival of the fittest' to explain how human societies develop in response to their physical surroundings. This led to the belief that environmental factors, such as climate and landforms, dictate social characteristics and cultural evolution. Darwinian theory provided a scientific veneer to these deterministic arguments, viewing societies as organisms shaped by natural selection in specific geographic settings.

63. (B) Areal differentiation.
The tradition of area studies, or regional geography, is fundamentally based on the concept of areal differentiation. This involves identifying and analyzing the unique combination of physical and human features that make one region distinct from another. Geographers in this tradition seek to understand the specific character of places through a synthesis of various factors. As popularized by Richard Hartshorne, areal differentiation became a primary goal of geography, emphasizing the importance of describing the Earth's surface as a mosaic of diverse, unique geographic units.

64. (C) How does the global capitalist economy shape the uneven development between this city and its periphery?
Structuralism in geography focuses on the deep, underlying social and economic structures that produce observable spatial patterns. A geographer using this perspective would most likely investigate how large-scale forces like the global capitalist economy create uneven development between different regions. This approach moves beyond individual perceptions or simple statistical correlations to look at power relations and class struggle. By examining these hidden mechanisms, structuralists aim to explain why certain areas flourish while others are marginalized, highlighting the influence of systemic economic forces on space.

65. (D) 1, 2, 3, 4 and 5
The Schaefer-Hartshorne debate was a pivotal intellectual conflict that fundamentally altered mid-twentieth-century geography. Hartshorne defended the traditional ideographic view, focusing on areal differentiation and regional uniqueness. Schaefer challenged this 'exceptionalism', arguing that geography should be a nomothetic science seeking universal laws. This debate served as a critical precursor to the Quantitative Revolution, representing a clash between the established guard and those pushing for a more scientific methodology. All statements accurately reflect the complexity and importance of this debate in shaping the evolution of the discipline.

66. (B) Paradigm shift
A paradigm shift occurs when a discipline experiences a fundamental change in its basic concepts, theories, and methodologies. The transition in geography from descriptive regional geography to analytical spatial analysis and model-building during the 1950s is a classic example. This shift, often called the Quantitative Revolution, moved the discipline away from the study of unique places toward the search for universal laws. It involved adopting new scientific standards and techniques, completely changing the way geographers perceive space and conduct their research.

67. (B) Road building, aqueducts, and mapping of conquered territories.
Roman geography was highly practical and utilitarian, reflecting the needs of a powerful and expanding empire. Their primary contributions were in engineering, administration, and military strategy. They excelled at building vast road networks and aqueducts, which required precise geographical knowledge and surveying. Additionally, they produced detailed maps and inventories of conquered territories to facilitate effective governance and resource management. This focus on functional applications stands in contrast to the more philosophical and mathematical traditions of ancient Greece, emphasizing the practical use of geographic space.

68. (B) The search for general laws and theories.
The nomothetic approach in geography is defined by the objective of identifying general

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contributing significantly to the discipline's academic growth and its practical application in addressing diverse national developmental problems.

81. (C) Geography should strive to be a law-seeking, nomothetic science.
Richard Hartshorne was a major proponent of the ideographic tradition in geography. In his seminal work, The Nature of Geography, he argued that the discipline is a chorological science focused on areal differentiation, or the study of unique regions. He was critical of environmental determinism and the search for universal spatial laws. Therefore, claiming that he believed geography should be a law-seeking, nomothetic science is factually incorrect. His work established a paradigm that prioritized the description and synthesis of unique places over the formulation of universal principles.

82. (B) 2, 1, 3, 4
The historical dominance of different schools of thought in geography has followed a specific chronological sequence. Regional geography, focused on areal differentiation and unique regions, was the dominant paradigm in the early twentieth century. This was followed by the Quantitative Revolution (Positivism) in the 1950s and 60s, which sought universal laws. Later, Behaviouralism emerged to address the cognitive aspects of human action. Finally, Postmodernism arose in the late twentieth century, critiquing grand theories. This sequence reflects the discipline's evolution from description to law-making and finally to critical deconstruction.

83. (C) Behaviouralism
Behaviouralism provides geographers with tools to investigate how human perception and habits influence spatial decision-making. In the case of an underutilized transport system, a behaviouralist approach would focus on commuters' cognitive barriers and mental maps rather than just objective efficiency. This perspective recognizes that people make choices based on their perceived environment, which may include fears, biases, or simple lack of information. By understanding these subjective factors, planners can address the real reasons behind human behavior, which often differ from the predictions of purely rational, positivist spatial models.

84. (A) 1, 2, 3 and 4 only
Contemporary geography is defined by multiple perspectives, each with its own focus and methodology. Positivism values objective, law-seeking science, while humanism emphasizes subjective lived experience and meaning. Feminism critiques gender bias, and postmodernism is skeptical of universal truths. Structuralism, however, focuses on underlying societal forces rather than individual decision-making, which is the domain of behaviouralism. Therefore, only the first four statements correctly describe their respective perspectives. Together, these viewpoints highlight the rich theoretical diversity and the ongoing critical debates that characterize the modern evolution of the geographical discipline.

85. (C) Immanuel Kant
Immanuel Kant provided geography with a critical philosophical foundation by classifying it as a chorological science. He argued that geography is the study of phenomena as they exist together in space, distinguishing it from history, which studies them in time. This logical classification established geography as a distinct and essential scientific field focused on spatial distribution and the arrangement of diverse features on the Earth's surface. Kant's ideas were instrumental in defining the scope and purpose of geography, influencing generations of scholars who sought to professionalize the discipline.

86. (B) Quantitative Revolution
The Quantitative Revolution is the most famous example of a paradigm shift in geography. During the 1950s and 1960s, the discipline moved away from traditional, descriptive regional geography toward a more scientific, analytical, and law-seeking spatial science. This shift involved the widespread adoption of statistical methods, mathematical modeling, and positivist philosophy. It fundamentally changed the questions geographers asked and the techniques they used, representing a revolutionary transformation in how knowledge is produced and validated. This revolution paved the way for modern, theoretical geography and spatial data analysis.

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Ritter's work combined empirical observation with this philosophical belief, making his methodology unique among the founders of modern geography and emphasizing the role of nature in human destiny.

75. (C) Determinism, possibilism, and cultural ecology.
The man-environment relationship tradition is a central theme in geography that explores how humans interact with their natural surroundings. This tradition includes key perspectives like environmental determinism, which views nature as the primary driver of human behavior, and possibilism, which emphasizes human agency and choice. It also encompasses cultural ecology, which studies how human cultures adapt to environmental challenges. These concepts analyze the dynamic and complex tension between natural forces and social actions, forming a core part of geographical inquiry into human life on Earth.

76. (C) Cosmography, mythology, and rudimentary mapping of the known world.
Ancient Indian geography, as preserved in the Vedas and Puranas, was primarily concerned with cosmography and mythology. These classical texts provided a detailed, though often mythological, description of the universe, the planets, and the Earth's physical structure. They also included rudimentary mapping of the known world, often centered on the Indian subcontinent. This tradition was deeply spiritual and philosophical, integrating geographical observations with religious beliefs to explain the nature of reality. It represents a unique early attempt to organize knowledge about the physical and celestial worlds.

77. (A) P-3, Q-4, R-1, S-2
Geographical dualisms represent the fundamental tensions and questions that define the discipline's scope and methodology. The physical versus human dualism asks whether to study nature or society. Regional versus systematic geography debates studying holistic places versus topical phenomena. The ideographic versus nomothetic divide concerns whether the goal is to describe unique cases or seek general laws. Finally, the qualitative versus quantitative dualism focuses on the method of data analysis, either through interpretation or measurement. Matching these dualisms to their core questions clarifies the discipline's intellectual structure.

78. (B) Humboldt adopted an inductive, comparative approach while Ritter adopted a deductive, teleological approach.
Although both are considered founders of modern geography, Alexander von Humboldt and Carl Ritter utilized very different methodologies. Humboldt was a dedicated explorer who used an inductive, comparative approach to identify universal connections and interrelationships in the natural world. In contrast, Ritter, an 'armchair' geographer, adopted a deductive and teleological framework, believing that the Earth's physical features were designed to shape human history. These contrasting methods highlight the diverse philosophical foundations that shaped the development of geography in the early nineteenth century.

79. (B) Behaviouralism
The study of 'mental maps' is a defining feature of behaviouralism in geography. This perspective argues that people navigate and interact with their environment based on their cognitive perceptions rather than just the objective physical layout. By analyzing how individuals perceive distances and locations, geographers can understand the subjective reality that guides spatial behavior. This approach highlights the importance of human psychology and information processing, offering a more nuanced view of spatial interaction that accounts for personal biases and the limitations of human knowledge in making spatial decisions.

80. (B) In-depth research and publications on specific topics like agricultural geography, urban geography, or social geography in the Indian context.
Thematic contributions in contemporary Indian geography refer to focused research on specific branches or topics within the discipline. This trend involves in-depth studies and publications on areas like agricultural, urban, or social geography, specifically within the Indian context. By investigating these specialized themes, geographers provide detailed insights into the complex spatial challenges facing India. This work moves beyond general descriptions to offer expert analysis on particular geographic issues,

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Therefore, topics like plate tectonics, climatic change, and soil formation are central concerns of this tradition. Electoral geography, however, is a branch of human and political geography that analyzes voting patterns and political processes, which have little to do with physical Earth systems. It is the least relevant topic among the options provided for a geographer working within the Earth Science tradition of the discipline.

94. (C) Nomothetic vs. Ideographic
A major geographical dualism is defined by two opposing philosophies or methodologies. The nomothetic versus ideographic divide represents a fundamental tension in the discipline's goals. The nomothetic approach seeks to formulate general laws and universal principles that apply to spatial patterns globally. In contrast, the ideographic approach focuses on describing the unique and particular characteristics of specific places or regions. This dualism has shaped many of the core debates in geography, particularly during the transition from traditional regional description to the modern scientific focus on spatial analysis and theory.

95. (D) 1, 2, 3 and 4
Fred K. Schaefer was a pivotal figure who challenged the 'exceptionalist' view of geography. Exceptionalism, championed by scholars like Richard Hartshorne, argued that geography is unique because it focuses on areal differentiation and cannot be a law-seeking science. Schaefer's famous critique called this view a crime and argued that geography should adopt the methods of science to formulate laws and theories. This debate was essential for the discipline's evolution, as it provided the theoretical justification for the Quantitative Revolution, fundamentally shifting geography toward a more analytical, nomothetic framework.

96. (C) Structuralist Geography
Structuralism in geography is defined by the goal of uncovering the hidden societal forces that shape observable spatial patterns. This perspective argues that what we see on the Earth's surface—such as inequality, urban decay, or industrial patterns—is produced by underlying mechanisms like capitalism, patriarchy, or class struggle. Structuralist geographers look beyond individual choices to analyze how these systemic forces constrain human agency and dictate the arrangement of space. By focusing on these invisible structures, they aim to explain the causal processes behind social and spatial injustice in the modern world.

97. (B) Cartography and regional inventories
Early Chinese scholars made significant and lasting contributions to geography through their excellence in cartography and the maintenance of detailed regional inventories. Their work focused on precise surveying techniques to map vast territories and record vital information for administrative control. These records included inventories of natural resources, land use, and population, which were essential for governing a large empire. This practical, data-driven tradition prioritized the functional needs of the state, establishing an advanced system of geographical information that was highly sophisticated for its time and crucial for imperial management.

98. (B) Richard Hartshorne
The term 'areal differentiation' is most closely associated with Richard Hartshorne, who made it the centerpiece of his definition of geography. In his work, The Nature of Geography, he argued that the primary task of the discipline is to describe and analyze the unique synthesis of physical and human features that define different regions. This perspective emphasizes that the Earth's surface is a mosaic of distinct areas, and geography's goal is to understand what makes each place unique. Hartshorne's concept solidified the ideographic tradition in twentieth-century geographical thought.

99. (C) Ideographic
A case study that focuses on describing the unique history, culture, and landscape of a specific place like the English Lake District is an example of an ideographic approach. The ideographic method prioritizes the detailed synthesis of particular characteristics that make a location one-of-a-kind. It is the cornerstone of regional geography, where the goal is understanding individual distinctiveness rather than seeking universal laws. This approach contrasts with the nomothetic or systematic methods, which look for general patterns and principles that apply across different places, ignoring their unique regional qualities.

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87. (A) Both A and R are true and R is the correct explanation of A.
Behavioural geography emerged as a powerful critique of the overly simplistic models of human behavior used in positivist geography. Positivism often assumed a perfectly rational 'economic man' who makes decisions with complete information. Behaviouralists argued that this was unrealistic, as human spatial choices are mediated through cognitive processes and a filtered, perceived reality. By introducing concepts like mental maps and the behavioural environment, they provided a more nuanced way to understand decision-making. This shift addressed the limitations of mechanistic models and reincorporated human psychology into geographical analysis.

88. (C) Practical and applied
Roman geography was characterized by its strong emphasis on practical and applied knowledge. As rulers of a vast empire, Romans needed accurate information for administration, military movements, and trade. This led to the development of detailed road maps, regional inventories, and large-scale engineering projects like aqueducts and fortifications. Unlike the Greeks, who focused on philosophical speculation and mathematical theories, the Romans prioritized utilitarian results that served the state's strategic interests. Their legacy in geography is defined by functional applications that helped manage and control geographic space effectively.

89. (A) Postmodernism
A study analyzing how the discourse of 'development' justifies the displacement of indigenous communities is a classic application of postmodernism. This perspective focuses on how language and discourse are used as instruments of power to construct reality and marginalize certain groups. Postmodern geographers deconstruct dominant narratives to reveal hidden biases and the political agendas they serve. By questioning the supposedly objective truth of 'development', this approach highlights the multiplicity of voices and the social construction of geographic knowledge, prioritizing the perspectives of the 'othered' and marginalized populations.

90. (C) Statement I is false, but Statement II is true.
The dualism of qualitative versus quantitative methods in geography is no longer considered an absolute or exclusive choice. While they were once seen as opposing paradigms, contemporary geography often utilizes a mixed-methods approach. This involves integrating numerical data and statistical analysis with descriptive, interpretative techniques to provide a more holistic understanding of spatial phenomena. Therefore, the first statement is false, as geographers frequently combine these methods. The second statement accurately reflects the modern trend of methodological integration, where both measurement and meaning are valued in geographical research.

91. (C) Environmental determinism
Darwin's concept of natural selection had a significant metaphorical influence on the development of environmental determinism in geography. Geographers in the late nineteenth century applied evolutionary ideas to human societies, suggesting that just as nature selects certain biological traits, the environment dictates social and cultural characteristics. This perspective argued that human progress and characteristics are determined by physical factors like climate and landforms. By viewing societies as organisms that must adapt to their surroundings to survive, geographers provided a seemingly scientific basis for the belief that environment controls human history.

92. (A) P-2, Q-4, R-1, S-3
Geographical schools of thought are defined by their unique key concepts. Positivism focuses on identifying spatial laws through empirical data. Behaviouralism is known for the concept of mental maps, which explore how individuals perceive their environment. Humanism emphasizes topophilia, or a person's deep, emotional sense of place. Finally, structuralism utilizes Marxist concepts like the mode of production to explain spatial patterns as products of economic structures. Matching these schools with their primary concepts illustrates the diverse theoretical frameworks used to interpret spatial reality and human interaction with the world.

93. (C) Electoral geography
The Earth Science tradition in geography focuses on the planet's physical systems and natural processes. This includes fields like geomorphology, climatology, and soil science.

NODIA

106. (A) P-3, Q-4, R-1, S-2
Geography's history is shaped by scholars from different nations whose work contributed to the discipline's professional development. Bernhardus Varenius was born in Germany but spent his productive years in the Netherlands. Carl Ritter and Alexander von Humboldt were both Prussian Germans who founded the modern German geographical tradition. Richard Hartshorne was an influential American geographer who formalized the concept of areal differentiation. Matching these scholars with their nationalities and roles illustrates the diverse international origins and the development of major schools of geographical thought in Europe and North America.

107. (A) Geography should adopt the methods of science to formulate laws and theories.
Fred K. Schaefer's seminal article, Exceptionalism in Geography, argued that geography must move beyond its traditional focus on unique regional descriptions. He claimed that for geography to be a true science, it should adopt scientific methods to formulate laws and universal theories. Schaefer criticized the 'exceptionalist' view, which suggested that geography was a unique discipline exempt from general scientific principles. His work was a major catalyst for the Quantitative Revolution, pushing geographers to prioritize spatial analysis, mathematical modeling, and nomothetic inquiry over purely descriptive, ideographic regional synthesis.

108. (C) Behaviouralism
The concept of the 'mental map' is central to the behaviouralist perspective in geography. This approach emphasizes that human spatial behavior is guided by an individual's internal perception and cognitive interpretation of the environment. Unlike positivist models that assume humans react rationally to the objective world, behaviouralism investigates how people filter information through their personal experiences and biases. By studying these mental maps, geographers can explain why spatial choices are often subjective and vary between individuals. This highlights the importance of human psychology and cognition in understanding how space is used.

109. (D) 1, 2, 3, 4 and 5
Modern geography is defined by a wide array of theoretical perspectives, each offering unique insights into the world. Positivism values objective science, while behaviouralism focuses on cognitive processes. Humanism prioritizes subjective lived experiences and meanings. Structuralism analyzes the impact of deep societal structures like economy and power, and postmodernism critiques grand meta-narratives by deconstructing knowledge. All five statements accurately define the core tenets of these diverse perspectives, illustrating the complexity and critical depth of the discipline's evolution from simple description to sophisticated social and scientific analysis.

110. (B) Geographical features exist to fulfill a grander purpose or design.
The teleological approach, most famously championed by Carl Ritter, is the belief that phenomena in the natural world are designed to serve a specific purpose. In a geographical context, Ritter argued that the Earth's continents and physical features were divinely created to guide human history and facilitate social development. This perspective sees nature as a purposeful agent rather than a random set of processes. While this view was influential in the early nineteenth century, it was later challenged by more mechanistic and evolutionary frameworks that prioritized natural laws over divine design.

111. (C) The Quantitative Revolution.
The dualism between qualitative and quantitative geography became highly pronounced during the Quantitative Revolution of the 1950s and 1960s. This period saw a massive shift toward using statistical methods, mathematical models, and positivist philosophy to find universal laws of space. As the discipline became increasingly mathematical, those who preferred traditional, descriptive, and interpretative methods found themselves at odds with the new scientific standard. This conflict highlighted the fundamental methodological divide between measuring spatial patterns with precision and understanding geographical phenomena through qualitative analysis, interpretation, and subjective human meaning.

112. (C) Structuralist

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history as a product of natural forces, establishing a rigid, naturalistic link between the physical Earth and the evolution of societies.

149. (A) Both A and R are true and R is the correct explanation of A.
The Quantitative Revolution represented a major paradigm shift in geography during the 1950s and 1960s. It involved a fundamental move away from traditional descriptive and ideographic approaches toward analytical, model-based, and nomothetic methodologies. Philosophically aligned with positivism, this revolution sought to transform geography into a more scientific and law-seeking discipline through the use of statistical techniques and mathematical modeling. This change altered the fundamental questions geographers asked and the ways knowledge was validated, permanently shifting the discipline's focus toward identifying universal spatial laws and explaining patterns through rigorous scientific inquiry.

150. (C) Search for universal truth
Postmodernism in geography is characterized by its skepticism toward grand narratives and its rejection of the idea that a single, objective, and universal truth can be discovered. Instead, it emphasizes deconstruction and the role of language in constructing multiple realities. Postmodernists focus on difference, otherness, and the perspectives of marginalized groups that are often ignored by traditional science. Therefore, searching for universal truth is not associated with postmodernism; rather, this perspective argues that knowledge is always situated, subjective, and reflects the power structures and interests of its creators.

151. (D) Richard Hartshorne
Richard Hartshorne is most closely associated with the concept of 'areal differentiation', which he defined as the core of geography. In his seminal 1939 work, The Nature of Geography, he argued that the discipline's primary task is to study and describe the unique synthesis of physical and human features that make each region distinct. This perspective established geography as a chorological science focused on the diversity of the Earth's surface. Hartshorne's work solidified the ideographic tradition in American geography, emphasizing the importance of integrated regional studies over the search for universal laws.

152. (A) P-4, Q-3, R-2, S-1
Geographical thought is built on specific terminology that defines its methodology and goals. Nomothetic refers to the formulation of general laws, while ideographic pertains to the study of unique and particular phenomena. Chorological relates to the study of spatial distribution and the arrangement of features on the Earth's surface. Finally, teleological involves the study of purpose or design in nature. Matching these terms to their correct meanings illustrates the diverse philosophical frameworks and research objectives that have shaped the evolution of geography from ancient philosophical inquiry to its professionalization as a modern science.

153. (C) Earth Science
A geographer utilizing satellite imagery to monitor physical processes like deforestation is working within the Earth Science tradition. This tradition focuses on the study of the planet's physical systems, natural resources, and the environmental changes occurring on the Earth's surface. By employing modern tools like remote sensing, geographers can provide precise data on landforms and vegetation patterns. This emphasis on understanding the physical environment and the natural processes that shape it is a core pillar of the discipline, bridging geography with other physical sciences and providing essential information for environmental conservation.

154. (C) Human spatial behaviour is mediated through cognitive processes and the perceived environment.
The central argument of behaviouralism in geography is that human spatial decisions are guided by cognitive processes and the perceived environment rather than just objective reality. Individuals filter information from the world through their personal experiences and biases, creating mental maps that influence their choices. This perspective emerged as a critique of the 'economic man' model, which assumed perfect rationality. By focusing on how people perceive distances and locations, behaviouralists provide a more nuanced understanding of spatial

NODIA

bias, assuming universal experiences while ignoring the roles and spatialities of women. By challenging these universalizing claims, feminist geographers aim to make women's lived experiences visible and show how space is constructed through gender relations. This perspective investigates how societal norms and power structures influence accessibility, mobility, and the daily lives of individuals across different environments and cultures.

119. (D) 1, 2, 3 and 4
Geography is defined by several major dualisms that reflect its historical and intellectual complexity. These include the physical versus human subject matter, the regional versus systematic organization, and the ideographic versus nomothetic debate over research goals. While these divisions once seemed rigid, contemporary geography often views them as complementary rather than mutually exclusive. Modern geographers frequently combine these perspectives to provide a more holistic and analytical understanding of space. All four statements correctly describe these dualisms and their role in the ongoing development and methodological maturation of the discipline.

120. (A) Social Darwinism
Social Darwinism refers to the application of Darwin's biological theories of evolution and natural selection to human societies. In the late nineteenth and early twentieth centuries, this ideology heavily influenced geographical thought, particularly environmental determinism. Geographers viewed societies as organisms that must compete and adapt to their physical environment to survive. This led to the belief that natural forces dictate social development and political power. Social Darwinism provided a seemingly scientific justification for hierarchical views of civilizations and established a rigid link between the physical Earth and human history.

121. (A) Space
The term 'chorology' is fundamentally concerned with the concept of space and the arrangement of phenomena across the Earth's surface. In geography, chorology refers to the study of specific places and the causal relationships between the diverse features found within them. As championed by scholars like Immanuel Kant and Richard Hartshorne, this spatial focus distinguishes geography from other sciences like history, which is chronological. By prioritizing the arrangement and integration of phenomena in space, chorology allows geographers to analyze areal differentiation and the unique character of different regions.

122. (A) Fred K. Schaefer
Fred K. Schaefer is famously known for his critique of 'exceptionalism' in geography. He challenged the idea that geography is a unique, descriptive discipline focused only on individual regions. In his seminal work, Schaefer argued that geography must adopt scientific methods to become a law-seeking, nomothetic science. His critique was a major catalyst for the Quantitative Revolution, as it provided the theoretical framework for geographers to move away from traditional regional description toward mathematical modeling and spatial analysis. This shift fundamentally altered the methodology and scientific status of the modern discipline.

123. (A) Both A and R are true and R is the correct explanation of A.
Humanistic geography prioritizes the subjective meanings, values, and experiences of individuals. Because these aspects of human life are complex and internal, they are not easily captured by numerical data or statistical models. Therefore, humanists often utilize qualitative methods like phenomenology, which explores lived experience, and hermeneutics, which focuses on interpretation. This approach emerged as a direct response to the perceived dehumanization of positivism. By focusing on how people perceive and connect with their world, humanism provides an essential understanding of the human element in spatial relationships and identities.

124. (C) What is the locational pattern of this phenomenon and what process explains it?
The spatial analysis tradition in geography is primarily concerned with the arrangement and distribution of phenomena across the Earth's surface. It asks questions about locational patterns, geometric configurations, and the causal processes that explain these arrangements. By utilizing quantitative methods and mathematical models, geographers in this tradition seek to identify universal laws of spatial organization.

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it often reflects male-centered biases. Therefore, claiming that feminist geography argues for biological determinism is incorrect. Instead, this perspective emphasizes that gender roles and inequalities are produced by societal norms and power structures, which can be addressed and challenged through critical spatial analysis.

137. (B) A detailed monograph on the historical geography of the Nile Valley.
An ideographic study focuses on the unique and particular characteristics of a specific place or region. A detailed monograph on the historical geography of the Nile Valley is a perfect example, as it synthesizes diverse physical and human factors to understand the distinctive character of that area over time. This approach prioritizes unique descriptions and synthesis rather than the search for universal laws. Other options, like statistical models or general theories, represent the nomothetic approach, which seeks generalizations that apply across different geographic locations, ignoring their individual regional identities and complexities.

138. (A) 1, 2 and 4 only
Geography is traditionally defined by major traditions that provide a framework for research. The Earth Science tradition is one of the oldest, focusing on physical processes. The man-environment relationship tradition includes perspectives like determinism and possibilism. The spatial analysis tradition became prominent with the Quantitative Revolution, utilizing mathematical models. However, the area studies tradition is ideographic and holistic, not nomothetic, as its goal is to understand unique regions rather than seeking universal laws. Therefore, only the first, second, and fourth statements correctly characterize their respective geographic traditions.

139. (B) The preservation, synthesis, and expansion of Greek and Roman geographical knowledge.
The most significant contribution of Arab geographers during the Middle Ages was their role in preserving and expanding upon classical Greek and Roman knowledge. While much of this intellectual heritage was lost in Western Europe, Arab scholars translated, synthesized, and improved upon these ancient works. They added their own empirical observations from extensive travel and advanced mathematical geography and astronomy. This scholarly continuity was vital for the history of science, as it eventually allowed for the revival of geographical thought in Europe during the Renaissance and the subsequent Age of Discovery.

140. (B) Structuralism
A geographer who analyzes a factory floor as a tool for management control is employing structuralist reasoning. Structuralism argues that spatial arrangements are produced by underlying power structures and economic systems, such as capitalism. In this view, the layout is not just functional but is designed to reinforce social hierarchies and maximize the surveillance of workers. This approach moves beyond individual perception or simple efficiency to focus on how systemic forces and power relations manifest in the built environment. It aims to reveal the hidden mechanisms that shape social life through space.

141. (B) Explain and predict spatial patterns using scientific laws.
The primary goal of positivism in geography is to create a more scientific and analytical discipline. It seeks to explain and predict spatial patterns by identifying universal laws through empirical evidence and the scientific method. Positivists prioritize objectivity and value-neutral research, using quantitative techniques and mathematical models to find regularities in data. This approach moves away from traditional regional description toward a more theoretical framework. By identifying these general principles, geographers can provide predictive insights into the arrangement and interaction of phenomena across the Earth's surface, establishing a rigorous spatial science.

142. (A) Both Statement I and Statement II are true.
Carl Ritter and Alexander von Humboldt, the founders of modern geography, each contributed a distinct methodology to the discipline. Ritter's work was defined by a teleological perspective, viewing the Earth as divinely designed to facilitate human development. In contrast, Humboldt emphasized an empirical, inductive, and comparative approach, using his extensive travels to find universal connections within the natural world. Together, their work established the foundations for both regional and

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reveal the hidden ideologies within landscapes. By viewing the city as a complex set of symbols rather than just a physical arrangement, postmodernists challenge traditional scientific models and emphasize the multiplicity and social construction of geographic knowledge.

131. (B) Both Statement I and Statement II are false.
Both statements in the question reverse the definitions of the ideographic and nomothetic methods. The ideographic method focuses on the detailed study of the unique and particular characteristics of a single place, not general theories. Conversely, the nomothetic method aims to formulate general laws and universal principles that apply across all places, rather than focusing on unique descriptions. Understanding the correct definitions of these two opposing methodologies is essential for grasping the fundamental dualisms and the theoretical evolution of the discipline from regional synthesis to modern spatial science and analysis.

132. (D) The rejection of mathematics in favor of pure description.
Ancient Greek geographers are famous for their pioneering use of mathematics to study the Earth. They made significant attempts to measure the Earth's circumference, developed the concept of climatic zones, and created the first systems of latitude and longitude. Therefore, claiming they rejected mathematics in favor of pure description is factually incorrect. In fact, their primary legacy is the establishment of a mathematical and empirical framework that transformed geography into a scientific discipline. This tradition of quantitative inquiry provided the essential foundations for all subsequent developments in Western cartography and geographical thought.

133. (B) It argues that spatial patterns are the product of deeper, underlying social or economic structures.
Structuralism in geography is a perspective that looks beyond observable spatial patterns to identify the underlying societal mechanisms that create them. It argues that physical and human arrangements are the results of deep social or economic structures, such as capitalism or class power. This approach suggests that individual choices are heavily constrained by these systemic forces. By analyzing these invisible structures, structuralists aim to explain uneven development and social inequality. This perspective provides a critical alternative to both individual-focused humanism and the mechanistic models of positivism in modern geographical research.

NODIA

134. (B) Both A and R are true but R is not the correct explanation of A.
Richard Hartshorne's The Nature of Geography was indeed a monumental work that defined the scope of the discipline. He argued that geography is a chorological science focused on areal differentiation, which identifies the unique synthesis of features in specific regions. While both statements are true, the second statement describes the core argument of the book rather than explaining why it was a monumental effort to define the discipline's scope. The book's significance lies in its comprehensive historical review and its successful establishment of a dominant paradigm for mid-twentieth-century American geography.

135. (B) The type of data and methods of analysis to use.
The dualism of qualitative versus quantitative geography focuses on the specific methodologies used for data collection and analysis. Quantitative geography relies on numerical data, statistical tests, and mathematical modeling to find universal spatial patterns and laws. In contrast, qualitative geography utilizes descriptive information, such as interviews, observations, and textual analysis, to understand meanings, experiences, and social processes. This division reflects different philosophies regarding the nature of geographical knowledge, although contemporary researchers increasingly use mixed-methods approaches to provide a more complete and nuanced understanding of the complex world we study.

136. (D) Arguing for the biological determinism of gender roles in society.
Feminist geography is a critical perspective that focuses on the social construction of gender rather than biological determinism. It aims to make women's experiences visible and investigates how gender relations are constituted through and influence spatial organization. Additionally, it challenges the supposed objectivity of traditional geographical knowledge, arguing that

Positivists would instead focus on modeling innovations, analyzing industrial locations, or predicting traffic flows, using measurable data that can be rigorously tested and verified.

161. (C) A grand, holistic synthesis of the physical universe.
Alexander von Humboldt's Kosmos is his masterpiece, representing a grand, holistic synthesis of the scientific knowledge of the mid-nineteenth century. In this monumental work, Humboldt sought to provide a unified view of the physical universe, exploring the interconnectedness of natural phenomena across different scales. He utilized an inductive and comparative approach, gathering vast amounts of empirical data from his extensive travels. Kosmos stands as a foundational text in modern geography, reflecting Humboldt's commitment to understanding the Earth's natural unity and the universal connections that link the cosmos, nature, and human life.

162. (A) The development and application of new tools and techniques like GIS, remote sensing, and statistical methods to study Indian geographical issues.
Methodological contributions in contemporary Indian geography focus on the advancement and application of modern technologies and analytical tools. This trend involves using Geographic Information Systems, remote sensing, and sophisticated statistical methods to investigate complex spatial and environmental issues. By integrating these technical advancements with traditional research, geographers can provide more precise and data-driven solutions to India's developmental challenges. These methodological improvements ensure the discipline's relevance and enhance its capacity for high-quality spatial analysis, significantly contributing to the effective management of resources, urban planning, and environmental protection throughout the Indian subcontinent.

163. (A) Both A and R are true and R is the correct explanation of A.
Systematic geography is fundamentally nomothetic because it seeks to identify general laws and processes that apply to specific phenomena globally. Unlike regional geography, which focuses on unique places, systematic geography studies categories like climate or population to understand universal spatial principles. Both statements are true, as the topical focus of systematic study allows geographers to build theoretical frameworks that cross regional boundaries. By analyzing these broad processes, the discipline can move beyond simple descriptions to provide predictive and analytical insights into the arrangement and interaction of various features on the Earth's surface.

164. (B) Structuralism
Structuralism in geography critiques both positivism and humanism for failing to account for the deep, unseen forces that shape society and space. It argues that spatial patterns and social inequalities are products of systemic structures like capitalism. Structuralists believe that these hidden forces constrain human agency and dictate the arrangement of the built environment. By focusing on mechanisms like power relations and class struggle, this perspective provides a critical explanation for uneven development. It aims to reveal the underlying structures that produce observable spatial arrangements, offering a critical alternative to traditional paradigms.

165. (C) Possibilism
Possibilism is the geographical concept that emphasizes human agency and choice in interacting with the environment. It argues that the physical environment does not determine human action but instead offers a range of possibilities from which people can choose based on their culture and technology. This perspective emerged as a reaction against environmental determinism, which viewed nature as the sole driver of human behavior. Possibilism highlights the creativity and adaptability of human societies, recognizing that while the Earth sets certain limits, human culture and ingenuity play a decisive role in shaping the world.

166. (B) Structuralism and Humanism
A research project exploring how different social classes experience and perceive urban decay blends elements from both structuralism and humanism. Structuralism provides the framework for analyzing the underlying economic and social structures, such as class, that shape the city. Humanism adds the focus on subjective lived experiences and perceptions of

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systematic studies. Their combined influence professionalized geography, bridging the gap between ancient traditions and the modern scientific pursuit of understanding the Earth.

143. (C) Postmodernism
Postmodernism in geography is characterized by its rejection of 'meta-narratives' or grand, all-encompassing theories that claim to provide a single, universal truth. Postmodernists argue that knowledge is socially constructed and reflects the power relations and biases of those who produce it. They celebrate multiplicity, difference, and the importance of marginalized voices. By deconstructing dominant theories, they reveal how geographical knowledge is used to maintain social control. This perspective offers a critical alternative to traditional paradigms like positivism and structuralism, emphasizing that spatial reality is always subjective and multifaceted.

144. (B) Postmodernism
Postmodernism in geography frequently utilizes qualitative methods such as discourse analysis, deconstruction, and the psychoanalysis of texts. These tools are used to reveal the hidden ideologies, power structures, and biases within geographical knowledge, including maps and historical documents. Postmodern geographers argue that our understanding of space is shaped by language and social construction. By deconstructing these texts, they aim to expose how certain voices are privileged while others are marginalized. This critical approach challenges the supposedly objective truths of traditional science and emphasizes the multiple meanings embedded in spatial representations.

145. (D) 1, 2, 3, 4 and 5
Modern geography was founded in the early nineteenth century by the German scholars Alexander von Humboldt and Carl Ritter. Humboldt prioritized a systematic, inductive approach to find connections between natural phenomena, while Ritter focused on regional studies with a teleological and historical perspective. Both geographers relied heavily on empirical observation, despite their different philosophical interpretations. Humboldt's Kosmos and Ritter's Erdkunde became the defining works of the era. All five statements correctly summarize the key contributions and characteristics of these two influential figures who professionalized the discipline and shaped its core traditions.

146. (B) Humanistic
A study focusing on the 'sense of place' and the lived experience of inhabitants is a classic example of humanistic geography. This perspective emphasizes human agency, consciousness, and the subjective meanings individuals attach to their environment. Unlike positivist models that seek universal laws, humanism values the unique, emotional connection between people and their homes. By exploring these qualitative aspects of spatial reality, humanistic geographers aim to understand how individuals perceive their world and build their identities. This approach reintroduces the human element into a discipline that often prioritizes abstract, objective data.

147. (C) A topical, law-seeking approach versus a holistic, place-based approach.
The dualism between systematic and regional geography represents the tension between two different ways of organizing geographical knowledge. Systematic geography is a topical approach that studies specific categories of phenomena across the world to identify general laws and processes. In contrast, regional geography is a holistic, place-based approach that synthesizes various physical and human elements within a specific area to understand its unique character. This debate centers on whether the discipline's primary goal should be identifying universal spatial principles or providing deep, integrated descriptions of particular parts of the Earth's surface.

148. (C) Environmental Determinism
In the late nineteenth and early twentieth centuries, the application of Darwinian theory to human geography significantly strengthened the ideology of environmental determinism. This perspective argued that the physical environment, especially climate and landforms, is the primary factor that determines human behavior, social character, and the development of civilizations. Geographers utilized Darwinian concepts like adaptation and natural selection as biological metaphors to explain social patterns. This deterministic worldview viewed human

NODIA

This approach prioritizes understanding patterns of distance, connectivity, and interaction, shifting the focus away from unique regional descriptions toward a more theoretical and analytical science that can predict and explain global spatial distributions.

125. (B) Man-environment relationship tradition
The man-environment relationship tradition explores the dynamic interactions between human societies and their natural surroundings. A major shift within this tradition occurred when geographers moved from environmental determinism, which views nature as the primary driver of human behavior, to possibilism. Possibilism emphasizes that while the environment offers certain options, humans have the agency and creativity to make choices. This transformation reflects a deeper understanding of human-nature interactions, moving away from rigid, naturalistic explanations toward a more nuanced view that values human culture, technology, and decision-making in shaping geographic reality.

126. (B) P-3, Q-4, R-1, S-2
Matching geographical concepts to their respective perspectives reveals the theoretical diversity of the discipline. Deconstruction is a primary tool for postmodernism, used to reveal hidden biases. Areal differentiation is the central concept of Richard Hartshorne's regional geography. Mental maps are the hallmark of behaviouralism, exploring subjective spatial perception. Finally, class struggle is a core concept in Marxist structuralism used to explain spatial inequality. These pairings illustrate how different philosophical frameworks provide unique lenses for interpreting the relationship between human societies, their economic systems, and the physical and perceived environment.

127. (B) It dealt with universal laws and principles affecting the Earth as a whole.
Bernhardus Varenius's Geographia Generalis was a groundbreaking seventeenth-century work that focused on universal geographical laws. It dealt with the Earth as a celestial body and identified principles that apply globally, such as climate zones and physical processes. This systematic approach contrasted with special geography, which focused on the description of individual regions. Varenius's work provided a scientific framework that influenced the professionalization of the discipline. It established the foundation for systematic geography, allowing the field to move beyond simple regional inventories toward the study of broad, law-like spatial phenomena.

128. (B) Positivism seeks objective laws, while Humanism explores subjective experience.
The fundamental difference between positivism and humanism in geography lies in their philosophical goals and methodologies. Positivism is a scientific approach that seeks to identify objective, universal laws and spatial patterns through empirical data and quantitative analysis. In contrast, humanism focuses on the subjective lived experience, intentions, and meanings that individuals attach to their environment. While one prioritizes value-free, predictable models, the other values human agency and consciousness. This distinction represents the core tension between geography as an analytical spatial science and as a discipline centered on understanding human meaning and identity.

129. (A) 1, 2 and 3
The history of geography is defined by scholars and their primary methodological stances. Carl Ritter is correctly matched with his teleological approach, believing nature has a divine purpose. Alexander von Humboldt is known for his inductive method, synthesizing vast amounts of empirical data. Fred K. Schaefer advocated for a nomothetic, law-seeking geography. Richard Hartshorne, however, championed an ideographic approach focused on areal differentiation rather than spatial analysis. Therefore, only the first three pairs are correctly matched, highlighting the different philosophical foundations that have shaped the discipline's evolution from description to law-making.

130. (B) Postmodernism
A geographer who interprets a city as a text with multiple, subjective meanings is working within the postmodernist perspective. Postmodernism rejects the idea of a single, objective reality and instead emphasizes that different groups 'read' and construct their own truths based on their experiences and power relations. This approach utilizes discourse analysis and deconstruction to

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interaction that accounts for the subjective and psychological factors that drive human activity.

155. (D) Chinese scholars were primarily focused on developing abstract dualisms like ideographic vs. nomothetic.
The statement regarding Chinese scholars is incorrect. While Greek, Roman, and Arab scholars each made foundational contributions to geography, early Chinese scholars were not primarily focused on developing abstract dualisms like ideographic versus nomothetic. Instead, their work was highly practical and utilitarian, excelling in cartography and administrative record-keeping. They maintained detailed regional inventories for governing a vast empire. The philosophical dualisms mentioned in the option were developed much later in the European tradition. Therefore, the description provided for Chinese scholars does not accurately reflect their primary contributions to the discipline.

156. (B) Feminism and Postmodernism
Feminism and postmodernism provide powerful critiques of the historical biases within the discipline of geography. Both perspectives argue that traditional geographical knowledge has been androcentric, white, and Eurocentric, reflecting the worldview of the powerful. Feminism focuses on making women's experiences visible and challenging gender inequality, while postmodernism seeks to deconstruct grand narratives and reveal hidden power structures. Together, these perspectives advocate for the recognition of multiple voices, difference, and otherness, challenging the supposedly objective and universal truths of mainstream science and promoting a more inclusive and socially just geographical discourse.

157. (C) Statement I is false, but Statement II is true.
The dualism of physical versus human geography is not a recent development. The first statement is false because this division can be traced back to the early professionalization of the discipline. As correctly noted in the second statement, this dualism reflects a fundamental distinction between the study of natural Earth phenomena and the study of human activities on its surface. While the two branches are interconnected, this division has shaped the organization and methodology of geography for centuries, influencing how research is conducted and how geographical knowledge is categorized in academic institutions worldwide.

158. (C) Humanism
Humanism in geography is the philosophical perspective that prioritizes lived experience, intentionality, and the subjective meaning of 'place' and 'home'. It emphasizes human agency and consciousness, arguing that spatial patterns cannot be fully understood through objective laws alone. Humanists explore the deep emotional connections people feel for their environment, using qualitative methods like phenomenology to investigate how individuals perceive and create their own identities within specific locations. This approach reintroduces the human element into a discipline that often focuses on abstract data, highlighting the importance of personal meaning in spatial reality.

NODIA

159. (D) 1, 2, 3 and 4
The Schaefer-Hartshorne debate was a critical turning point in mid-twentieth-century geographical thought. Hartshorne championed the ideographic view, focusing on areal differentiation and the unique character of regions. Schaefer challenged this, arguing for a nomothetic approach where geography would become a law-seeking science. This debate highlighted the fundamental conflict over the discipline's nature and methodology. It served as a vital precursor to the Quantitative Revolution, pushing geographers to adopt more scientific and analytical techniques. All four statements correctly describe the complexity and significance of this debate in the historical evolution of the discipline.

160. (B) The poetic experience of walking through a forest.
Positivism in geography is a scientific approach that prioritizes objective, empirical data and the formulation of universal laws. It relies heavily on statistical models and mathematical techniques to explain and predict spatial phenomena. Therefore, the poetic experience of walking through a forest, which is subjective and personal, is the least likely topic for a positivist researcher. Such qualitative meanings and lived experiences are the domain of humanistic geography.

A research paper exploring how global finance shapes the urban landscape of a city is a characteristic of structuralism. This perspective looks beyond individual perceptions or simple patterns to find the underlying economic forces that dictate spatial arrangements. Structuralists argue that the capitalist system and the circulation of capital are the primary drivers of urban development and inequality. By analyzing how systemic power and economic structures manifest in a city like Mumbai, this approach provides a critical explanation of the hidden mechanisms that create the modern, uneven urban environment.

113. (C) The rediscovery of ancient mapping techniques for modern use.
Contemporary trends in Indian cartography are primarily defined by the integration of modern technology. This includes using Geographic Information Systems and remote sensing to create accurate thematic maps for national planning and development. The field also focuses on producing digital atlases and web-based mapping services for better accessibility. However, the rediscovery of ancient mapping techniques for modern practical use is not a recognized contemporary trend. Instead, the focus remains on advancing technical precision and data visualization through cutting-edge tools that address India's modern spatial and developmental challenges.

114. (A) 2, 4, 1, 3
The timeline of geographical thought begins with the ancient Greek geographers who laid the scientific foundations. This was followed by the Romans, who prioritized practical, administrative mapping. During the medieval period, Arab geographers preserved and expanded upon this classical knowledge. Finally, the modern era was ushered in by seventeenth and eighteenth-century scholars like Varenius and Kant, who formalized the discipline's philosophical and organizational structure. Arranging these contributors chronologically shows the long-term evolution of geography from ancient philosophical inquiry to its professionalization as a modern scientific discipline.

115. (B) Area studies focuses on synthesis of a place, while spatial analysis focuses on isolating variables and patterns.
The key distinction between area studies and spatial analysis lies in their approach to geographic data. Area studies, or regional geography, is essentially ideographic and focuses on the holistic synthesis of various physical and human elements within a particular place. Its goal is to understand the unique character of a region. Conversely, spatial analysis is nomothetic, focusing on isolating specific variables and using mathematical models to identify universal spatial patterns. While one seeks to synthesize everything within a boundary, the other seeks to find general principles that apply across boundaries.

116. (A) Both Statement I and Statement II are true.
Alexander von Humboldt was a central figure in the birth of modern geography, known for his holistic worldview. He emphasized that nature is an interconnected whole, where physical features and biological life are closely linked. His masterpiece, Kosmos, represents a grand synthesis of the scientific knowledge of his era. Humboldt utilized an inductive approach, gathering vast amounts of empirical data through his travels to find universal laws and connections. His work established geography as a systematic science based on rigorous observation and a commitment to understanding the Earth's complex natural unity.

117. (C) Strong practical and utilitarian character.
The legacy of ancient Roman geography is defined by its functional and strategic focus. As administrators of a massive empire, the Romans required geographical knowledge that served practical ends. This led to their excellence in road building, cartography for military and administrative purposes, and regional surveys of resources. Unlike the more theoretical and philosophical Greeks, the Romans were primarily concerned with the utilitarian application of spatial information to maintain control and manage trade. This practical tradition ensured that geography was used as a vital tool for statecraft and the governance of diverse territories.

118. (C) Feminism
Feminism in geography critiques the discipline's historical failure to recognize gender as a fundamental social and spatial category. It argues that geographical knowledge has traditionally reflected an androcentric, or male-centered,

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the individuals within those classes. By combining these perspectives, geographers can understand both the systemic forces that produce urban problems and the emotional and psychological impact those problems have on diverse groups of people, providing a more holistic and critical urban analysis.

167. (B) A universally accepted set of concepts, theories, and methods that define a scientific discipline at a particular time.
In the context of geographical thought, a paradigm is a universally accepted theoretical framework that defines the standards and practices of the discipline at a specific time. It includes the concepts, methods, and questions that geographers consider valid. As popularized by Thomas Kuhn, scientific progress involves shifts from one paradigm to another. For example, the shift from descriptive regional geography to quantitative spatial analysis represented a major paradigm shift. Paradigms provide the necessary structure for research and education, guiding how geographers perceive and investigate the spatial arrangement of the world.

168. (C) Systematic vs. Regional
Bernhardus Varenius's division of geography into general and special categories is the direct historical antecedent to the modern systematic versus regional dualism. General geography focused on universal laws and principles that apply globally, which corresponds to systematic geography. Special geography was concerned with the detailed description of particular regions, mirroring the focus of regional geography. This fundamental division, established in the seventeenth century, provided the structural framework that has shaped the organization of geographical knowledge for centuries. It remains a central theme in debates regarding the most effective way to study and research spatial phenomena.

169. (D) 1, 2, 3, 4 and 5
Contemporary geography is defined by a diverse range of theoretical perspectives, each offering a unique lens for interpreting spatial reality. Behaviouralism studies subjective perception, while positivism assumes an objective world that can be modeled. Humanism focuses on meaning and lived experience. Structuralism argues that human agency is constrained by unseen forces like capitalism. Finally, postmodernism questions all grand theoretical claims. All five statements accurately define the core tenets of these perspectives, illustrating the theoretical complexity and critical depth that characterize the evolution of the modern geographical discipline and its sophisticated ways of analyzing the world.

NODIA

170. (B) A comprehensive study of urbanization patterns in the Gangetic plain.
A thematic contribution in contemporary Indian geography refers to in-depth research on a specific branch or topic within the discipline, tailored to the Indian context. A comprehensive study of urbanization patterns in the Gangetic plain is a perfect example, as it focuses on a specific geographical theme—urbanization—within a particular region of India. These studies provide detailed insights into the complex spatial and social changes occurring in the country. By focusing on specialized themes, geographers contribute to a better understanding of national development challenges, providing essential data and analysis for planning and policy-making.

171. (C) Statement I is true, but Statement II is false.
The spatial analysis tradition in geography prioritizes the geometric and locational properties of phenomena. The first statement is true because this tradition focuses on patterns of distance, connectivity, and arrangement. However, the second statement is false. Spatial analysis is fundamentally nomothetic, not ideographic. It seeks to identify universal laws and general spatial principles through mathematical modeling and quantitative techniques rather than focusing on the uniqueness of each individual pattern. This scientific approach aims to provide predictive and theoretical insights into the spatial organization of the world, distinguishing it from traditional regional description.

172. (C) Androcentric or male-centered bias.
The most fundamental critique offered by feminist geography addresses the discipline's historical androcentric, or male-centered, bias. Geographers in this tradition argue that spatial knowledge has traditionally reflected the experiences and interests of men, while ignoring the roles and spatialities of women. By exposing

Feminist geographers argue that space is not a neutral stage but is deeply gendered. This perspective investigates how the arrangement of public and private environments reflects and reinforces societal norms about gender roles and power structures. By analyzing urban planning, mobility, and resource access through this lens, feminist geographers reveal how traditional spatial organization can marginalize certain groups. Making these gendered experiences visible provides a more accurate and inclusive understanding of the world. This approach challenges androcentric biases in geographical research, advocating for spatial arrangements that reflect the diverse needs and experiences of all individuals.

197. (D) Locational analysis
The man-environment relationship tradition in geography explores the dynamic interactions between human societies and their natural surroundings. This includes concepts like environmental determinism, possibilism, and cultural ecology, which analyze how people adapt to and transform their environment. Locational analysis, however, belongs to the spatial analysis tradition. It focuses on geometric patterns, locational theories, and mathematical models to explain the arrangement of phenomena across space, prioritizing abstract relationships over the direct human-nature interaction. Therefore, locational analysis is not considered a part of the man-environment relationship tradition, as its primary concern is spatial organization rather than environmental influence.

198. (B) Develop verifiable theories and laws explaining spatial phenomena.
A positivist geographer's main objective is to move beyond description to provide scientific explanations and predictions. This involves using the scientific method to develop verifiable theories and universal laws about spatial patterns. Positivism prioritizes objectivity and value-neutral research, relying on empirical data and quantitative techniques like mathematical modeling and statistical analysis. By identifying these regularities, geographers can build a theoretical framework that explains how phenomena are arranged and interact across the Earth's surface. This analytical approach seeks to transform geography into a rigorous spatial science, moving it away from traditional, subjective regional description and interpretation.

199. (C) Ritter - The Nature of Geography
The history of geography includes many influential scholars and their defining works. Varenius wrote Geographia Generalis, Humboldt wrote Kosmos, and Hartshorne is famous for his work on Areal Differentiation in The Nature of Geography. However, Carl Ritter did not write The Nature of Geography; his magnum opus was the massive work titled Erdkunde. Ritter's Erdkunde established the foundations for modern regional geography with a historical and teleological perspective. Therefore, the pairing of Ritter with The Nature of Geography is incorrect, as that seminal work belongs to the American geographer Richard Hartshorne, published in 1939.

200. (C) Revolutionary upheavals in worldview.
The concept of a paradigm shift, as introduced by Thomas Kuhn, suggests that scientific progress does not occur through a simple accumulation of facts. Instead, it happens through revolutionary upheavals in a discipline's worldview. A shift occurs when the existing paradigm can no longer explain new observations, leading to a period of crisis and the eventual adoption of a completely new set of theories, methods, and concepts. In geography, the shift from descriptive regionalism to quantitative spatial analysis is a classic example. This transformation fundamentally changes how researchers perceive their field, the questions they ask, and their methodology.

201. (C) Phenomenology and Existentialism
Humanism in geography is rooted in the philosophical traditions of phenomenology and existentialism. These philosophies prioritize human consciousness, lived experience, and the subjective meaning of existence. Humanist geographers use these frameworks to explore how individuals perceive and connect with their environment, emphasizing concepts like intentionality and the 'sense of place'. This approach emerged as a reaction against the mechanistic and dehumanizing models of positivism. By focusing on the unique, subjective reality of individuals, humanism reintroduces human agency and creativity into geographical

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adaptation and survival to human societies. It also bolstered biogeography through evolutionary frameworks and introduced concepts of struggle into social studies. Humanistic geography emerged much later, in the mid-twentieth century, as a reaction against the mechanistic and deterministic models influenced by Darwinism and positivism. Humanism prioritizes subjective experience and agency, which are concepts quite different from the naturalistic frameworks of evolutionary theory.

179. (D) Spatial analysis
The spatial analysis tradition in geography was the one most significantly invigorated and transformed by the Quantitative Revolution. During the 1950s and 1960s, this tradition moved away from simple locational descriptions toward the use of mathematical models and statistical techniques to identify universal spatial laws. By prioritizing geometry, distance, and connectivity, spatial analysis became the dominant framework for geographers seeking to make the discipline more scientific and analytical. This revolution provided the tools for predictive research into the arrangement and interaction of phenomena, fundamentally changing how geographers perceive and analyze the spatial organization of the world.

180. (B) Marxist Structuralism
Marxist structuralism argues that spatial patterns are produced by the underlying 'mode of production' and the inherent conflicts between capital and labor within a capitalist system. A geographer using this perspective would explain a city's social geography as a manifestation of these deep economic forces rather than just individual choices or patterns of perception. This approach focuses on how the circulation of capital and power relations shape uneven urban development and social inequality. By analyzing these hidden structures, Marxist structuralists aim to reveal the systemic mechanisms that dictate the arrangement of space and the social life within it.

181. (C) Statement I is false, but Statement II is true.
The history of geography includes a vital period during the Middle Ages when Arab scholars played a crucial role in the preservation of classical knowledge. The first statement is false because Greek and Roman works were not lost to the Arab world; instead, they were highly valued. As correctly noted in the second statement, Arab scholars translated, synthesized, and significantly built upon this ancient heritage. Through extensive travel and scientific advancement in astronomy and mathematical geography, they maintained the continuity of the discipline. This intellectual bridge was essential for the eventual revival of geographical science in Renaissance Europe.

182. (C) Positivist
A geographer utilizing questionnaires and statistical regression to test hypotheses is working within the positivist paradigm. Positivism emphasizes that only knowledge derived through the scientific method and empirical, quantitative verification is valid. This approach seeks to identify objective spatial laws and regularities by analyzing numerical data. By prioritizing value-neutrality and hypothesis testing, positivism aims to create a predictive and analytical science of spatial patterns. This methodology contrasts with qualitative approaches, focusing on measurable information that can be rigorously tested and used to build broad theoretical models of human and physical spatial interaction.

183. (C) He was a strong advocate for a nomothetic, law-seeking geography.
Richard Hartshorne was a major proponent of the ideographic tradition in American geography. In his influential 1939 book, The Nature of Geography, he argued that the core task of the discipline is areal differentiation—the study of unique regions. He viewed geography as an ideographic science rather than a law-seeking one. Therefore, claiming that he was an advocate for a nomothetic, law-seeking geography is factually incorrect. His work established a dominant paradigm that focused on the integrated description and synthesis of particular places, prioritizing regional uniqueness over the search for universal spatial laws and principles.

184. (A) Both A and R are true and R is the correct explanation of A.
Behaviouralism emerged as a significant response to the limitations of the positivist paradigm in geography. Positivism often utilized simplistic models of human behavior, assuming

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individuals act as perfectly rational 'economic men' with complete information. Behaviouralists argued that this approach ignored the complex cognitive processes and subjective perceptions that actually drive human decision-making. By introducing concepts like mental maps and the behavioural environment, they provided a more realistic and nuanced way to understand spatial interaction. This shift addressed the mechanistic nature of positivist models by reincorporating human psychology into the analysis of spatial patterns and choices.

185. (C) Subject matter
The dualism of physical versus human geography represents a fundamental separation based on the subject matter of study. Physical geography focuses on the natural world, including landforms, climate, soils, and ecosystems. Human geography focuses on the activities and social structures of human societies, such as urban development, culture, and economy. While the two branches are deeply interconnected through the man-environment relationship, this division has shaped the academic organization and curriculum of the discipline for centuries. It reflects the challenge of integrating the study of the Earth's natural systems with the complex actions of humanity.

186. (A) Postmodernism or Feminism
Postmodernism and feminism are perspectives deeply interested in how space is constructed through power relations and social norms. These geographers would investigate how the design of public spaces, like parks, can include or exclude specific groups, such as the homeless or teenagers. They argue that space is not neutral but reflects the interests of the powerful. By deconstructing urban landscapes and making marginalized experiences visible, these perspectives challenge the supposedly objective nature of planning. This critical approach aims to reveal the social injustices embedded in the built environment, advocating for more inclusive and diverse urban spaces.

187. (B) Bernhardus Varenius
Geographia Generalis is the seminal work of Bernhardus Varenius, published in the seventeenth century. This text is foundational in the history of geography because it established the clear distinction between general and special geography. General geography explored universal laws and principles that applied to the entire Earth, while special geography focused on the detailed description of particular regions. Varenius's work provided a scientific framework that influenced the development of the discipline for over a century. It was instrumental in moving geography beyond simple descriptions toward the study of broad, law-like spatial and physical phenomena.

188. (B) 2, 3 and 4 only
Postmodernism in geography is defined by its critical stance toward traditional scientific paradigms. It is characterized by a deep skepticism toward grand meta-narratives and the idea of a single, objective reality. Instead, postmodernists focus on difference, otherness, and the marginalized voices that are often ignored by mainstream theories. They embrace the multiplicity of readings and interpretations of any landscape, arguing that knowledge is socially constructed through language. Therefore, only statements focusing on skepticism, difference, and multiple interpretations correctly describe the postmodern perspective. This approach rejects the search for universal truth or value-free research.

NODIA

189. (B) The study of spatial relationships and distributions.
The chorological concept of geography, famously advocated by Immanuel Kant and later Richard Hartshorne, defines the discipline by its focus on space. Chorology is the study of specific places and the arrangement of diverse phenomena as they exist together on the Earth's surface. This spatial perspective emphasizes distribution, spatial relationships, and the synthesis of physical and human features within a given area. It distinguishes geography from history, which is concerned with time and chronological sequences. By focusing on how phenomena are arranged in space, geographers can analyze areal differentiation and the unique character of regions.

190. (B) Inductive and empirical
Alexander von Humboldt's work is famously characterized as being inductive and empirical. As a dedicated explorer, he gathered vast amounts

of detailed data from his extensive travels in the Americas and elsewhere. He used these empirical observations to find universal connections and interrelationships within the natural world, aiming to synthesize scientific knowledge into a holistic view of the Earth. Unlike Carl Ritter, who used a more deductive and teleological framework, Humboldt prioritized direct observation and the collection of evidence to build his theories. His methodology established a foundation for modern, systematic geography based on rigorous scientific inquiry.

191. (C) Regional geography
Regional geography is the branch of the discipline focused on the unique synthesis of physical and human elements that give a particular area its distinctive character. It is an ideographic approach that provides a holistic description of a region, examining how various factors like climate, landforms, culture, and economy interact within a specific boundary. By understanding this unique combination, geographers can explain why one place differs from another, a concept known as areal differentiation. This holistic synthesis contrasts with systematic geography, which focuses on specific phenomena across different locations to identify general laws and processes.

192. (B) Behaviouralism and Humanism
Behaviouralism and humanism are the two geographical perspectives most directly concerned with the internal world of human beings. Behaviouralism focuses on cognitive processes and perception to understand how individuals filter information and make spatial decisions through mental maps. Humanism explores human consciousness, intentions, and the subjective meanings people attach to their environment, emphasizing lived experience and the 'sense of place'. While one seeks to build models of spatial behavior and the other seeks to understand human meaning, both reintroduce the human element into geography, moving beyond the mechanistic and objective frameworks of traditional positivism.

193. (B) P-3, Q-4, R-1, S-2
Different geographical perspectives address distinct research questions based on their core philosophies. Positivism asks about statistical correlations to find universal laws. Behaviouralism investigates the 'mental maps' that guide individual decisions. Humanism explores the emotional attachment and lived experience of a person in a specific place. Finally, structuralism analyzes how systemic forces like the capitalist system produce urban development and spatial inequality. Matching these schools with their primary questions illustrates the theoretical diversity of the discipline and the different ways geographers interpret the relationship between human actions, societal structures, and the physical and perceived spatial environment.

194. (B) Cosmographical and philosophical inquiry.
Ancient Indian geographical contributions are best characterized as a tradition of cosmographical and philosophical inquiry. Found in classical texts like the Vedas and Puranas, this tradition provided a detailed, often mythological description of the universe and the Earth's physical structure. It involved celestial observations and rudimentary mapping, deeply integrated with spiritual beliefs about the nature of reality. Unlike the utilitarian Roman tradition or modern quantitative models, this approach prioritized understanding the Earth as part of a larger, divinely ordered cosmos. It represents an early and unique intellectual attempt to organize knowledge about the physical and celestial worlds.

195. (B) Synthesis
The primary focus of the area studies or regional tradition in geography is on synthesis. This approach involves integrating diverse information about physical features, climate, culture, and economy to understand the holistic and unique character of a specific place. Geographers in this tradition seek to explain how these various elements work together to create a distinctive region. This synthesis is essentially ideographic, emphasizing the complexity and particularity of individual locations. It contrasts with traditions like spatial analysis, which prioritize analysis by isolating specific variables to identify general laws and patterns across different geographic boundaries.

196. (A) Both Statement I and Statement II are true.

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these biases, feminist geographers aim to make women's lived experiences visible and show how space is constructed through gendered power relations. This critical perspective challenges the supposed universality of mainstream geographical research, advocating for a more inclusive and socially just understanding of how all individuals navigate and interact with their environment.

173. (C) Carl Ritter
Carl Ritter represents the culmination of classical German geography during the early nineteenth century. Along with Alexander von Humboldt, he founded modern geography, but his methodology was distinct. In his massive work, Erdkunde, Ritter emphasized a regional and historical perspective, often incorporating a teleological view that the Earth was designed to shape human destiny. His approach was more deductive than Humboldt's, seeking the higher purpose behind regional arrangements. Ritter's work established a framework for studying the complex relationships between the physical environment and human civilizations, solidifying the importance of regional synthesis in the discipline.

174. (D) Postmodernist critique
A study that deconstructs colonial-era maps to reveal their hidden ideologies is a classic example of a postmodernist critique. Postmodernism in geography argues that knowledge is not objective but is socially constructed and reflects specific power structures. By analyzing these maps, researchers can expose how colonial powers constructed a particular vision of the 'Orient' to justify their control. This approach focuses on language, discourse, and the multiplicity of interpretations, rejecting the idea of absolute truth. Postmodernist critiques aim to reveal the political agendas embedded in geographical representations, prioritizing the voices of the marginalized.

175. (B) P-4, Q-3, R-2, S-1
Geography's history is marked by scholars who provided its philosophical and organizational foundations. Immanuel Kant established the philosophical basis for geography as a chorological science. Bernhardus Varenius introduced the dualism of general versus special geography in the seventeenth century. Richard Hartshorne formalized the concept of areal differentiation as the discipline's primary goal. Finally, Fred K. Schaefer famously criticized exceptionalism, pushing for a scientific, law-seeking methodology. Matching these geographers to their key contributions illustrates the long-term evolution of the discipline from foundational philosophical classification to professional synthesis and modern scientific critique and transformation.

176. (C) Revolutionary and fundamental
A paradigm shift, as popularized by Thomas Kuhn, represents a revolutionary and fundamental change in the core concepts, theories, and practices of a scientific discipline. It is not a gradual or minor adjustment. Instead, a shift occurs when the existing framework can no longer explain new evidence or address critical problems, leading to a complete reevaluation of the field. In geography, the shift from descriptive regional studies to analytical spatial science during the Quantitative Revolution is a classic example. This transformation alters the fundamental questions geographers ask and the methods they use for research.

177. (A) description; generalization
The fundamental difference between the ideographic and nomothetic approaches in geography lies in their ultimate research goals. The ideographic approach focuses on the detailed description of unique and particular regions, aiming to understand their specific, holistic character. In contrast, the nomothetic approach seeks to find generalization and universal laws that explain spatial patterns across different places and times. While one prioritizes the distinctiveness of individual locations, the other seeks to build broad theoretical models. This methodological tension between description and generalization has shaped many of the core debates and traditions in the evolution of the discipline.

178. (D) Leading directly to the emergence of humanistic geographical approaches.
Darwin's theory of evolution had a major impact on geography, but it did not lead directly to the emergence of humanistic approaches. Instead, it provided a scientific basis for environmental determinism by applying biological concepts like

NODIA

analysis, moving beyond the search for universal laws to understand the depth of human meaning in space.

202. (A) Both A and R are true and R is the correct explanation of A.
The Schaefer-Hartshorne debate was a critical moment that shaped mid-twentieth-century geography. Richard Hartshorne defended the traditional, ideographic view, focusing on areal differentiation and the uniqueness of regions. Fred K. Schaefer challenged this 'exceptionalist' stance, arguing for a more scientific, theoretical, and nomothetic approach. Both statements are true, as this debate crystallized the fundamental conflict over the discipline's nature and methodology. It served as a major catalyst for the upcoming Quantitative Revolution, pushing geographers to prioritize spatial analysis and law-seeking inquiry. This transition permanently altered the scientific status and research goals of the modern geographical discipline.

203. (B) A global study of the processes of desertification.
Systematic geography involves the study of a specific phenomenon or process as it occurs globally rather than focusing on a single region. A global study of the processes of desertification is a perfect example, as it examines this specific physical process across different continents to identify universal causes and patterns. This topical approach aims to identify general principles and spatial laws. Other options, like the geography of the Amazon or the history of Rome, are examples of regional geography, which synthesizes various physical and human elements within a particular place to understand its unique character and distinctive development.

204. (C) The use of GIS and Remote Sensing for mapping and analysis.
The contemporary trend in Indian geography focusing on cartography is defined by the integration of advanced technologies. This includes using Geographic Information Systems and remote sensing to create highly accurate thematic maps and conduct sophisticated spatial analysis. These modern tools allow geographers to visualize complex data sets and address developmental and environmental challenges effectively. By prioritizing technical precision and data visualization, this trend enhances the practical application of geography in planning and resource management. This technological emphasis represents a significant shift from traditional mapping techniques toward a more analytical and data-driven cartography in the Indian context.

205. (A) 1, 2 and 3 only
Geographical thought is shaped by several key milestones. Darwinian theory strengthened environmental determinism by providing a biological framework for human-nature interactions. Immanuel Kant categorized geography as a chorological science focused on space. Bernhardus Varenius established the early dualism of general versus special geography. However, the fourth statement is incorrect; the Schaefer-Hartshorne debate was about the fundamental nature of geography (ideographic versus nomothetic) rather than just quantitative versus qualitative methods. Therefore, only the first three statements correctly describe major historical contributions and debates that have influenced the professional development and methodological organization of the geographical discipline.

206. (D) Postmodernism
Deconstruction is a fundamental methodological tool for postmodernism in geography. Postmodernists use it to analyze geographical texts, maps, and discourses to reveal their hidden ideologies, power structures, and marginalized perspectives. This approach argues that knowledge is not objective but is socially constructed. By deconstructing a narrative, postmodernists aim to expose how certain meanings are privileged while others are silenced. This critical methodology challenges the supposedly universal truths of traditional paradigms like positivism. Deconstruction allows geographers to explore the multiplicity of voices and the complex power relations that shape our understanding of spatial reality and identity.

207. (B) Behaviouralism
Behaviouralism in geography is built on the fundamental belief that human spatial behavior is a product of cognitive processing. This perspective argues that people do not react directly to the objective physical environment.

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information that was sophisticated for its time and crucial for managing and maintaining imperial stability and resource allocation.

219. (C) Statement I is true, but Statement II is false.
Humanistic geography arose in the mid-twentieth century as a strong reaction against the mechanistic models of positivism and early behaviouralism. The first statement is true because humanists sought to reintroduce human agency and meaning into the discipline. However, the second statement is false. Humanistic geographers are not interested in creating predictive mathematical models. Instead, they focus on subjective human experiences, consciousness, and the deep emotional connections people feel for their environment. This qualitative approach prioritize understanding human intentionality and the 'sense of place' over the search for objective, law-like predictions of behavior using abstract data.

220. (C) Area studies
The concept of 'areal differentiation' is the guiding principle for the area studies tradition in geography. Popularized by Richard Hartshorne, this concept defines the discipline as the study of how physical and human features combine to create unique regions. The goal is to identify and analyze what makes one place distinct from another. This holistic synthesis of various elements within a boundary provides a deep understanding of the individual character of the Earth's surface. Areal differentiation prioritizes the descriptive and particularizing approach of regional geography over the search for universal laws, making it central to the area studies tradition.

221. (B) Postmodernism
Postmodernism in geography focuses on how language and discourse are used to represent the world. A postmodernist would analyze a text or map to reveal the hidden ideologies and power structures it represents rather than just its factual accuracy. This approach utilizes deconstruction to expose how certain meanings are privileged and others marginalized. Postmodernists argue that all knowledge is socially constructed and reflects specific interests. By questioning the supposedly objective truth of geographical representations, this perspective highlights the multiplicity of voices and the social construction of space, prioritizing a critical interpretation over traditional scientific models or simple descriptions.

222. (B) Providing a model for competition and adaptation that was applied to human societies and their environments.
Darwin's On the Origin of Species had a profound and lasting impact on geographical thought by providing a biological framework for the man-environment relationship. Geographers adapted evolutionary concepts like natural selection, struggle for existence, and adaptation to study human societies. This led directly to the development of environmental determinism, which viewed societies as organisms shaped by their physical surroundings. This perspective suggested that environmental factors dictate social and cultural characteristics. Darwinian theory provided a seemingly scientific basis for this deterministic worldview, establishing a rigid, naturalistic link between the physical Earth and the history and development of human civilizations.

223. (C) Using numerical data and statistical analysis vs. using descriptive data and interpretative analysis.
The dualism of qualitative versus quantitative geography represents the choice between two different methodologies for data collection and analysis. Quantitative geography relies on numerical data, statistical models, and mathematical techniques to identify universal spatial patterns and laws. In contrast, qualitative geography utilizes descriptive information, such as interviews, observations, and textual interpretation, to understand subjective meanings and social processes. This methodological division reflects different philosophies regarding the nature of geographical knowledge. Most contemporary geographical research now integrates both approaches to provide a more comprehensive and nuanced understanding of the world, valuing both precise measurement and deep interpretative meaning.

224. (B) Both A and R are true but R is not the correct explanation of A.
Alexander von Humboldt is correctly celebrated as a founder of modern geography, and his work

NODIA

The idea that 'space is gendered' is a central tenet of feminist geography. This perspective argues that spatial arrangements are not neutral but reflect and reinforce societal norms about gender roles and power relations. Feminist geographers investigate how traditional urban planning and accessibility often marginalize women's experiences and mobility. By making these gendered spatialities visible, this approach challenges androcentric biases in geographical inquiry and promotes a more inclusive understanding of the world. Feminism emphasizes that spatial reality is constructed through social relations, and addressing gender inequality requires a critical analysis of both social systems and physical environments.

214. (C) Structuralist
A geographer who argues that urban poverty is determined by the logic of capitalist accumulation is adopting a structuralist perspective. Structuralism looks beyond individual choices to identify the underlying economic and social structures that dictate spatial arrangements. This approach argues that the global capitalist system and class power are the primary drivers of spatial patterns and inequality. By analyzing these hidden structures, structuralists aim to provide a critical explanation for uneven development and social injustice within the urban environment. This perspective emphasizes that space is produced by systemic forces rather than simple patterns of perception or individual actions.

215. (C) The processes of weathering and erosion.
The Earth Science tradition in geography focuses on the planet's physical systems and natural processes. Investigating the processes of weathering and erosion is a classic example of research within this tradition, as it falls under the subfield of geomorphology. This tradition prioritize understanding the Earth's natural environment, including its lithosphere, atmosphere, and hydrosphere. Other topics, such as voting behavior, mental maps, or cultural meanings, belong to human, political, or behavioural geography. Therefore, physical processes that shape the Earth's surface are the primary concern for geographers working within the long-standing Earth Science tradition of the discipline.

216. (A) 1, 2, 3, and 4 only
Geography employs two distinct methodological goals: nomothetic, which seeks general laws, and ideographic, which provides unique descriptions. The spatial analysis tradition is primarily nomothetic, using mathematical models for generalization, while the area studies tradition is ideographic, focusing on the uniqueness of specific regions. However, the fifth statement is incorrect because Fred Schaefer famously advocated for a nomothetic approach, not an ideographic one. He criticized Hartshorne's ideographic perspective to push for a law-seeking spatial science. Therefore, only the first four statements correctly characterize these fundamental methodological divisions and the scholars associated with the tradition's theoretical evolution.

217. (B) Paradigm shift
The shift in geography from focusing on unique regional descriptions to discovering universal spatial laws is a classic example of a paradigm shift. This transformation, known as the Quantitative Revolution, occurred in the mid-twentieth century and fundamentally changed the discipline's basic concepts and methodologies. It moved geography away from being a descriptive, ideographic study toward becoming an analytical, nomothetic science based on positivist philosophy and mathematical modeling. Such a change represents a revolutionary upheaval in how geographers perceive their field, the questions they consider valid, and the scientific standards they use to validate their research findings.

218. (B) Descriptive inventories and mapping for administrative control.
Ancient Chinese geography was characterized by its highly practical and administrative focus. Scholars and officials prioritized the creation of detailed territorial maps and regional inventories of resources, population, and land use. This data-driven tradition was essential for the effective governance and military control of a large, diverse empire. Unlike the philosophical Greeks, the early Chinese tradition prioritized functional descriptions that served the state's strategic and bureaucratic needs. Their excellence in cartography and systematic record-keeping established an advanced system of geographical

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Instead, they filter information from the world through their personal experiences and biases, creating mental interpretations that guide their decision-making. By focusing on this internal 'behavioural environment', behaviouralists provide a more realistic and nuanced explanation of spatial patterns than mechanistic positivist models. This approach highlights the importance of human psychology and information processing in understanding how individuals navigate and interact with the world around them.

208. (C) Statement I is false, but Statement II is true.
Alexander von Humboldt and Carl Ritter had very different methodological and philosophical approaches. The first statement is false because while they are both founders of modern geography, their frameworks were distinct. As correctly stated in the second statement, Humboldt's approach was inductive and comparative, synthesizing empirical data from his travels. In contrast, Ritter's approach was deductive and teleological, believing that the Earth's features were divinely designed to shape human history. These contrasting methods—one focused on finding connections in nature and the other on nature's higher purpose—highlight the diverse philosophical foundations that professionalized the discipline in the nineteenth century.

209. (C) Practical application in mapping for administration and conquest.
The primary contribution of the Roman Empire to geography was its practical and strategic character. Romans were administrators and conquerors who required accurate geographical information for governing a massive territory. This led to their excellence in large-scale mapping, road building, and regional inventories for administrative and military purposes. Unlike the Greeks, who focused on philosophical speculation and mathematical models, the Romans prioritized utilitarian results that served the state's functional needs. This practical tradition ensured that geography was used as a vital tool for statecraft and managing diverse regions, emphasizing the utilitarian use of space, distance, and resource control.

210. (B) Physical vs. Human
The dualism of physical versus human geography is the fundamental split between studying the Earth's natural systems and studying human activities. Physical geography focuses on landforms, climate, and ecosystems, while human geography analyzes social structures, culture, and economic patterns. While the two branches are interconnected through the man-environment relationship, this division has historically shaped the organization of the discipline. It reflects the challenge of integrating the study of physical Earth processes with the complex, purposeful actions of humanity. This subject-matter dualism remains a core organizational framework in geographical education and research across the globe.

211. (C) It values subjective interpretation.
Positivism in geography is a scientific approach that rejects subjective interpretation in favor of objectivity and value-neutrality. It relies on the scientific method to identify universal spatial laws based on empirical data and quantitative verification. Positivism provides the philosophical foundation for quantification and the use of mathematical models in the discipline. Therefore, claiming that positivism values subjective interpretation is incorrect. Its primary goal is to create a more predictive and analytical science of spatial patterns, moving away from individual biases and qualitative meanings to find broad regularities that apply across different geographical places and times.

212. (A) P-4, Q-2, R-1, S-3
The history of geography is defined by influential scholars and their defining concepts or works. Bernhardus Varenius wrote the foundational Geographia Generalis in the seventeenth century. Alexander von Humboldt is known for his holistic work, Kosmos. Carl Ritter authored the massive Erdkunde, which established regional geography. Finally, Richard Hartshorne defined the discipline's scope in The Nature of Geography. Matching these authors with their primary contributions illustrates the long-term evolution of the discipline, from early dualisms to nineteenth-century professionalization and twentieth-century theoretical synthesis, highlighting the diverse philosophical foundations and major works that have shaped geographical thought.

213. (C) Feminism

NODIA

Kosmos provided a holistic, empirical view of the natural world. While both statements are true, the reason provided describes the content and methodology of Humboldt's masterpiece rather than explaining why he is considered a founder of the modern discipline. His status as a founder stems from his overall role in professionalizing geography, establishing systematic study based on rigorous scientific inquiry, and his lifelong commitment to gathering vast amounts of empirical data to find universal connections and unity in the diverse phenomena of nature.

225. (C) Structuralism or Postmodernism
A geographer investigating how colonial urban planning was designed for segregation and control is adopting a perspective influenced by structuralism or postmodernism. Structuralism analyzes how deep power relations and societal structures dictate spatial arrangements. Postmodernism critiques geographical representations and reveals the hidden ideologies and power structures within them. Both perspectives look beyond surface patterns to expose how the built environment reflects the interests of the powerful. This critical approach investigates how space is constructed to maintain social control, challenging the supposedly neutral nature of planning and highlighting the social injustices embedded in the historical and contemporary landscapes of colonial cities.

226. (A) Behaviouralism is scientific and seeks models, while Humanism is interpretative and seeks understanding.
The key difference between behaviouralism and humanism lies in their scientific goals and methodological foundations. Behaviouralism is a scientific approach that seeks to build models of human spatial behavior by studying cognitive processes and perception through objective data like questionnaires. In contrast, humanism is an interpretative perspective that seeks an empathetic understanding of human consciousness and lived experience, using qualitative methods like phenomenology. While both reintroduce the human element into geography, behaviouralism aims for predictive models of spatial decision-making, while humanism prioritizes understanding the subjective meanings, intentions, and emotional bonds that individuals attach to their specific geographical environment.

227. (C) Earth Science
A study focused on the geomorphology of a mountain range falls squarely within the Earth Science tradition. This tradition in geography emphasizes the study of the planet's physical systems, natural processes, and the environmental features of the Earth's surface. Geomorphology, the study of landforms and the processes that shape them, is a core branch of this tradition. By analyzing physical features like mountains through rigorous scientific observation, geographers provide essential insights into natural Earth processes. This focus on the physical environment distinguishes the Earth Science tradition from traditions that prioritize human activities, regional synthesis, or abstract spatial organization models.

NODIA

228. (B) 1, 2 and 3 only
Geography is defined by major dualisms that represent fundamental divisions in subject matter, methodology, and philosophy. These include physical versus human, regional versus systematic, and ideographic versus nomothetic. However, the fourth statement is incorrect because these dualisms are not rigid or unbridgeable divides. Modern geography often views them as complementary, with many researchers integrating multiple perspectives to provide a more holistic analysis. Therefore, only the first three statements correctly describe the core divisions that have shaped the discipline's evolution. These dualisms highlight the ongoing methodological tensions and the diverse frameworks that geographers use to organize knowledge and research spatial phenomena.

229. (B) Carl Ritter
The teleological viewpoint is most famously associated with Carl Ritter, a founder of modern geography. He believed that the Earth's physical features and the arrangement of continents were divinely created to guide the development and history of human civilizations. This perspective suggests that nature has a higher purpose and is designed to facilitate social progress. Ritter's methodology was deductive and regional, as he sought to uncover this divine design through his detailed study of different parts of the world.

synthesis of existing information to develop comprehensive regional studies and theories.

267. (B) the Earth's physical structure was designed with a specific purpose or plan for humanity.
Carl Ritter's geographical philosophy was deeply influenced by teleological thinking, which posits that nature is organized according to a predetermined purpose. In his view, the physical features of the Earth were not randomly distributed but were part of a divine plan. He believed this arrangement was specifically designed to facilitate human development and shape the course of history.

268. (A) present a holistic perspective on the interconnectedness of natural phenomena.
Alexander von Humboldt's monumental work, Kosmos, represents his lifelong effort to understand the natural world as a unified entity. The publication sought to articulate a holistic perspective by demonstrating the profound interconnectedness of all natural phenomena. Through systematic measurement and comparison, Humboldt aimed to reveal the causal relationships and general principles that link climate, geology, flora, and fauna globally.

269. (C) It viewed the Earth's geography primarily in relation to its influence on human history.
Carl Ritter's Erdkunde reflects a characteristically anthropocentric approach to the discipline, placing human development at the center of geographical study. His work was less concerned with natural processes in isolation and more focused on how the physical environment influenced human history. He viewed the Earth's features as a stage designed to support and guide the progress of human civilizations.

270. (D) systematic; regional
Although both scholars co-founded modern geography, they are associated with different traditions within the field. Humboldt's work focused on identifying universal laws and causal relationships across the globe, aligning him with systematic geography. In contrast, Ritter's major contributions involved the comprehensive study of specific areas and their relationship to human history, firmly placing him within the regional geography tradition.

271. (C) The view that the physical environment dictates human development.
The introduction of Darwinian theory provided a new framework for geographers to analyze the relationship between organisms and their surroundings. This adaptation led to the rise of environmental determinism, a perspective suggesting that human societies and cultures are primarily shaped by their physical environment. This view held that the characteristics of a region directly dictate the developmental path of its inhabitants.

272. (B) study the unique and distinctive characteristics of particular regions.
Richard Hartshorne's concept of areal differentiation defined geography as the study of the unique character of different places on the Earth's surface. According to this perspective, the primary goal of the discipline is to identify, describe, and explain the specific combinations of features that make one region distinct from another. This approach prioritizes the particular over the search for universal laws.

273. (D) It treated geography as an exceptional, descriptive field rather than a law-seeking science.
Fred K. Schaefer launched a significant critique against the Hartshornian view, arguing against the idea that geography was an exceptional discipline. He claimed that the focus on unique regional descriptions limited the field's scientific potential. Schaefer instead advocated for geography to become a law-seeking, nomothetic science, similar to economics or physics, by concentrating on the formulation of general spatial theories.

274. (A) establishing general laws and theories.
The term nomothetic, as championed by Fred K. Schaefer, refers to an approach that prioritizes the discovery of universal laws and general theories. In a geographical context, this means the discipline should focus on identifying the underlying principles that govern the spatial distribution of various phenomena. This perspective moves away from describing unique places toward developing a predictive and scientific spatial science.

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dimensions using sophisticated astronomical observations. Their excellence in navigation and cartography was essential for governing a vast territory and facilitating trade. By synthesizing classical works with their own empirical data from extensive travel, Arab scholars maintained the continuity of geographical science during a period of neglect in Western Europe, eventually influencing the Renaissance and the subsequent Age of Discovery.

236. (C) Quantitative Revolution shift
The term 'paradigm shift' in geography is most strongly associated with the Quantitative Revolution of the 1950s and 1960s. This movement represented a revolutionary and fundamental change in the discipline's basic concepts, theories, and methodologies. Geography moved away from being a descriptive, regional study toward becoming an analytical, law-seeking spatial science based on positivist philosophy and mathematical modeling. Such a change altered the fundamental questions geographers asked and the scientific standards they used to validate knowledge. This revolution paved the way for modern, theoretical geography and spatial data analysis, representing a major upheaval in how the discipline perceives and conducts its research.

237. (C) Behaviouralism - Cognitive processes
Different geographical perspectives are correctly paired with their primary areas of focus. Behaviouralism is known for its emphasis on cognitive processes and perception to understand human spatial decision-making. In contrast, positivism focuses on objective laws rather than subjective meaning, while structuralism focuses on systemic forces rather than individual perception. Humanism prioritizes subjective lived experience over the search for universal laws. Therefore, only the pairing of behaviouralism with cognitive processes is accurate. This perspective highlights the importance of human psychology and information processing, offering a nuanced explanation of spatial interaction that accounts for the subjective factors that drive human activities and choices.

238. (A) 1, 2, 3, and 4 only
Geography's history is built on influential scholars. Varenius established the dualism of general versus special geography. Kant provided the philosophical basis for geography as a chorological science. Humboldt was an advocate of systematic, empirical study, and Ritter championed a regional, teleological approach. However, the fifth statement is incorrect; Hartshorne and Schaefer were twentieth-century American geographers, not ancient Greek scholars. Therefore, only the first four statements correctly summarize the key historical contributions that professionalized the discipline. These scholars established the foundational frameworks and major schools of thought that have shaped geographical theory and methodology from the seventeenth to the mid-twentieth century.

NODIA

239. (B) Application of philosophy and mathematics to understand the Earth.
The most significant legacy of ancient Greek scholars to geography was their application of philosophical and mathematical principles to understand the world. They moved beyond mythology to develop empirical methods for measuring the Earth's size and shape. Scholars like Eratosthenes and Ptolemy pioneered systems of latitude and longitude, identifying climatic zones and establishing the scientific foundations of cartography. This intellectual tradition prioritized logical reasoning and systematic observation, transforming geography into a rigorous discipline. Their work provided the essential framework for all subsequent developments in Western geographical thought, establishing the Earth as a subject of scientific and philosophical inquiry for centuries.

240. (D) Geometrical network analysis
The man-environment relationship tradition in geography explores how human societies interact with their natural surroundings. This includes themes like environmental determinism, possibilism, and cultural adaptation to physical conditions. Geometrical network analysis, however, belongs to the spatial analysis tradition. It focuses on the mathematical properties and locational patterns of networks, such as transportation or communication lines, prioritizing abstract spatial arrangements over the direct human-nature interaction. Therefore, geometrical network analysis does not fit within

options provided, historical geography is the one that does not fit into the standard classification of major geographic traditions that define the discipline's broad intellectual scope.

251. (B) The practical requirements of managing a large empire.
Roman geographical inquiry was primarily guided by the functional requirements of their expanding territory. Rather than pursuing abstract philosophical or mathematical theories, their efforts focused on practical applications. This approach served the administrative, military, and commercial needs of the state, facilitating effective governance and control over the diverse regions under the authority of the Roman Empire.

252. (A) Establishing the concept of a spherical Earth and its climatic zones.
Ancient Greek scholars played a foundational role in transitioning geographical study from mythological narratives to scientific inquiry. They were pioneers in conceptualizing the Earth as a sphere and calculating its circumference. Additionally, they introduced the classification of the world into distinct climatic zones, known as klimata, based on the varying angles of solar radiation across different latitudes.

253. (C) Greeks were more theoretical and mathematical, while Romans were more descriptive and practical.
The intellectual evolution of geography reveals a clear divergence between these two classical civilizations. Greek scholarship was characterized by a strong emphasis on mathematical theory, scientific inquiry, and philosophical speculation regarding the nature of the world. Conversely, Roman geographers adopted a more pragmatic and descriptive stance, prioritizing information that supported the logistical and administrative demands of empire-building.

254. (D) established foundational principles for map-making using a coordinate system.
Ptolemy's Geographia represents a landmark contribution to the field of cartography. Although it contained inaccuracies regarding the Earth's physical dimensions, its lasting significance lies in the introduction of systematic map-making principles. By establishing the use of a coordinate system involving latitude and longitude, this work provided the essential framework that dominated European geographical understanding for centuries.

255. (C) a comprehensive, descriptive regional geography.
Strabo's Geographica is characterized as a monumental encyclopedic work that exemplifies the descriptive tradition of Roman geography. It provides a detailed account of the known world, focusing on the specific attributes of various regions. This comprehensive regional study was intentionally designed to serve as a practical reference for statesmen and military commanders in managing imperial affairs.

256. (B) Creating precise administrative and topographical maps.
Chinese civilization maintained a sophisticated and independent tradition of geographical scholarship that excelled in cartographic precision. Their efforts were particularly concentrated on the development of administrative and topographical mapping. These maps were highly detailed and accurate for their era, serving essential functions in the governance and spatial organization of the vast territories under Chinese imperial control.

257. (D) integrated into cosmological and philosophical writings.
Ancient Indian geographical contributions are distinguished by their integration into broader religious and metaphysical frameworks. Instead of existing as a standalone empirical science, geographical descriptions of rivers, lands, and the universe were typically embedded within Puranic, cosmological, and philosophical texts. This approach reflected an early intellectual focus on the relationship between humanity and the environment through a non-empirical lens.

258. (A) Al-Idrisi
During the medieval period, Al-Idrisi emerged as a prominent figure who synthesized geographical knowledge from diverse traditions. Commissioned by King Roger II of Sicily, he produced a comprehensive world map and an accompanying geographical text. This monumental work successfully blended detailed descriptive information with advanced

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debates and the diverse frameworks geographers use to organize knowledge and research the complex world of space and human action.

246. (B) Behaviouralism
Behaviouralism in geography brought concepts like 'mental maps' and the 'behavioural environment' to the forefront of spatial analysis. This perspective argues that human spatial actions are guided by cognitive perceptions rather than just objective physical reality. By focusing on how individuals filter information and perceive distances, behaviouralists provide a more realistic and nuanced explanation of spatial patterns than mechanistic positivist models. This approach highlights the importance of human psychology and information processing in understanding decision-making. By investigating this 'perceived reality', behaviouralism reincorporated the human element into geography, offering a sophisticated way to interpret spatial behavior and the subjective factors that drive human interaction with the environment and the arrangement of space.

247. (B) The study of human societies in terms of adaptation and environmental influence.
The introduction of Darwinian theory into geography provided a powerful conceptual framework for the study of the man-environment relationship. Geographers adapted evolutionary concepts like adaptation and natural selection as biological metaphors to explain how human societies develop in response to their physical surroundings. This led directly to the development of environmental determinism, which viewed societies as organisms that must adapt to specific geographic conditions to survive and flourish. This perspective suggested that environmental factors dictate social characteristics and cultural progress. Darwinian theory provided a seemingly scientific basis for this naturalistic worldview, establishing a rigid link between the physical Earth and the history, character, and evolution of diverse human civilizations.

248. (B) The area studies tradition.
The area studies tradition, also known as regional geography, is centrally concerned with understanding the unique character of a place. This involve a holistic synthesis of the specific physical and human elements that make a region distinctive. By analyzing how factors like climate, landforms, culture, and economy combine within a particular boundary, geographers in this tradition explain the concept of areal differentiation. This approach is essentially ideographic, prioritizing the Integrated description and synthesis of particular places over the search for universal laws. It focuses on understanding the Earth's surface as a mosaic of diverse, unique geographic units, highlighting the distinctive synthesis that defines each individual location and its local identity.

249. (A) Both A and R are true and R is the correct explanation of A.
Humanism in geography prioritizes human agency, consciousness, and the subjective meanings individuals attach to their world. Both statements are true, as this perspective emerged in the mid-twentieth century as a strong reaction against the perceived mechanistic and deterministic models of positivism and early behaviouralism. Humanists argued that these analytical frameworks dehumanized the discipline by ignoring human creativity and lived experience. By focusing on intentionality and the 'sense of place', humanism provided an essential understanding of the human element in spatial reality. This shift addressed the limitations of mechanistic models and emphasized the importance of human psychology, values, and consciousness in understanding how people perceive and connect with space and their environment.

250. (B) Historical geography
Geography is traditionally defined by four major traditions that provide a comprehensive framework for research and education. These include the Earth Science tradition, the man-environment relationship tradition, the area studies tradition, and the spatial analysis tradition. Each tradition emphasizes a different aspect of the discipline, ranging from physical processes and human-nature interactions to regional descriptions and geometric patterns. While historical geography is a vital and influential subfield that provides a temporal perspective on geographical phenomena, it is not typically listed as one of these four primary recognized traditions. Therefore, among the

NODIA

phenomena are distributed and arranged across space. This tradition relies heavily on mathematical models and statistical techniques to identify patterns, regularities, and geometric structures. By focusing on locational dynamics, it seeks to develop general theories that explain the spatial organization of both human and physical features.

284. (A) The Man-Environment Relationship tradition.
The Man-Environment Relationship tradition explores the complex and reciprocal interactions between human societies and their physical settings. Within this framework, various perspectives have emerged to explain these interactions. These include environmental determinism, which emphasizes the environment's control over human activity, and possibilism, which highlights human agency. This tradition remains central to understanding the dynamics between culture and nature.

285. (C) Spatial Analysis tradition.
A geographer investigating the geometric patterns and market areas of cities is operating within the Spatial Analysis tradition. This approach focuses on discovering spatial regularities and the underlying structures of human settlement and economic activity. By using analytical tools to explain the arrangement of cities, this tradition emphasizes the identification of universal spatial laws rather than describing unique regional characteristics.

286. (D) development along often separate methodological and theoretical lines.
The dualism between physical and human geography represents a major divide within the discipline, separating the study of natural processes from that of human societies. Although integrated approaches exist, these two branches have historically developed along different methodological and theoretical lines. This fragmentation has often led to separate research agendas and a complex, sometimes divided, identity for the discipline.

287. (C) Systematic geography
A study focusing on the global distribution and general principles of a specific topic, such as wheat cultivation, falls under systematic geography. This approach isolates a single category of phenomena—in this case, an agricultural product—and examines its patterns and causal factors across various locations worldwide. The goal is to establish general laws or principles governing that specific geographical element.

288. (B) provide a holistic synthesis of various phenomena within a specific area.
The primary objective of regional geography is to create a holistic synthesis of all physical and human elements within a defined area. Instead of focusing on a single phenomenon globally, it examines how climate, landforms, culture, and economy interact within a specific region to produce its unique character. This approach aims for a comprehensive understanding of complex, co-existing realities.

289. (D) systematic knowledge provides the components for regional synthesis.
The relationship between systematic and regional geography can be viewed as complementary rather than purely conflicting. Systematic geography provides the specialized knowledge and general principles about individual phenomena, which serve as the essential building blocks for research. Regional geography then uses these individual components to construct a comprehensive and integrated understanding of the unique complexity found within a particular place.

290. (A) The divergence between seeking general patterns and describing unique places.
The fundamental tension in the regional versus systematic dualism lies in the different goals of each approach. Systematic geography seeks to identify general patterns and universal laws that apply across the Earth's surface. In contrast, regional geography emphasizes the description and appreciation of the unique, complex realities of specific locations. This represents the discipline's struggle between generalization and particularization.

291. (C) A quantitative approach.
A research project utilizing statistical regression to analyze spatial relationships, such as the link between income and distance from a city center, exemplifies the quantitative approach. This

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cartographic techniques, representing a significant high point in the spatial knowledge of that era.

259. (C) They preserved and advanced scientific geographical traditions.
Arab geographers played a critical role in maintaining intellectual continuity during the decline of scientific inquiry in medieval Europe. By building upon classical Greek and Indian knowledge, they not only preserved existing traditions but also significantly advanced the fields of mathematical, astronomical, and regional geography. Their scholarship ensured that scientific geographical thought continued to evolve and expand throughout the Middle Ages.

260. (A) Al-Beruni focused on a detailed study of a specific region (India), while Al-Idrisi created a world map.
While both scholars made significant contributions to Arab geography, their primary focuses were distinct. Al-Beruni is noted for his meticulous and detailed regional studies, particularly his comprehensive analysis of the physical and cultural geography of India. In contrast, Al-Idrisi is primarily recognized for his cartographic achievements, specifically the creation of a sophisticated and comprehensive map of the entire known world.

261. (D) He proposed dividing geography into systematic (general) and regional (special) branches.
Bernhardus Varenius is recognized for establishing a critical structural foundation for the academic discipline of geography. In his influential work, Geographia Generalis, he introduced a fundamental dualism that categorized geographical study into two distinct branches. This division separated the field into general geography, focusing on universal laws, and special geography, which concentrated on the detailed study of specific regions.

262. (B) time.
Immanuel Kant provided a significant philosophical justification for the existence of geography as an independent discipline. He conceptualized the field as a chorological science, which focuses on phenomena that co-exist in space. To distinguish this from other fields, he compared it to history, which he defined as a chronological science primarily concerned with events that follow one another in time.

263. (C) universal physical laws and phenomena affecting the entire Earth.
Within the dualistic framework proposed by Varenius, general geography corresponds to the modern concept of systematic geography. This branch is concerned with identifying and understanding the universal physical laws and phenomena that operate across the entire planet. Its primary focus includes global systems such as planetary motion, climatic patterns, and hydrography, rather than the unique features of specific places.

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264. (D) Its main focus is the study of phenomena arranged and associated in space.
According to Kant's philosophical framework, the classification of geography as a chorological science emphasizes its role in studying the spatial arrangement of various phenomena. This perspective suggests that the discipline's primary objective is to analyze how different features and processes exist together and are associated within specific areas, establishing space as the fundamental dimension of geographical inquiry.

265. (A) Regional Geography
Varenius's concept of special geography is the direct intellectual ancestor of what is now known as regional geography. This branch of the discipline focused on the detailed and comprehensive description of particular places or regions. It aimed to examine the unique characteristics that distinguish one area from another, providing a counterpart to the universal laws sought in general geography.

266. (B) Humboldt relied on empirical fieldwork, whereas Ritter was primarily a university-based academic.
The methodological approaches of these two founders of modern geography were markedly different. Alexander von Humboldt was an active explorer who emphasized empirical observation and the collection of primary data through extensive fieldwork in diverse environments. Conversely, Carl Ritter operated primarily within an academic university setting, focusing on the

While this view was influential in the nineteenth century, it represents a unique philosophical foundation that contrasts with more mechanistic and naturalistic scientific frameworks.

230. (B) How does fear of crime in public spaces differ by gender and shape mobility patterns?
A feminist geographer focuses on how gender relations are constructed through space and how societal power structures influence the experiences of individuals. Investigating how fear of crime differs by gender and affects mobility is a perfect example of feminist research. This approach examines the gendering of public space and reveals the inequalities embedded in the environment. By making women's lived experiences and fears visible, feminist geographers challenge androcentric biases in urban planning and mobility research. This critical perspective aims to provide a more inclusive and socially just understanding of how different groups navigate and experience their daily spatial reality.

231. (A) Both Statement I and Statement II are true.
The Quantitative Revolution in the 1950s and 1960s was a major transformation that sought to make geography more scientific and law-seeking. This movement moved the discipline away from traditional descriptive regional studies toward analytical spatial science. Both statements are true, as this revolution was philosophically aligned with positivism, which prioritizes empirical verification and the search for universal laws through mathematical modeling and statistical techniques. This shift fundamentally altered the questions geographers asked and the scientific standards they used to validate knowledge, permanently changing the discipline's focus toward identifying general spatial principles and explaining patterns through rigorous scientific inquiry.

232. (C) Humanism
Humanism is the geographical perspective that seeks to understand the world through the subjective experiences and consciousness of individuals. It emphasizes human agency, intentions, and the meanings people attach to their environment. Humanist geographers argue that spatial patterns cannot be fully understood through objective laws alone, as personal values and lived experience play a critical role. By using qualitative methods like phenomenology, humanism explores deep emotional connections like the 'sense of place'. This approach provides an essential understanding of the human element in geographical reality, moving beyond abstract data to focus on how people perceive and create their identities within space.

233. (D) Fred K. Schaefer
Fred K. Schaefer is the scholar who famously criticized geography's 'exceptionalism' in the mid-twentieth century. He challenged the idea that geography is a unique, descriptive discipline focused only on individual regions. In his seminal work, Schaefer argued that geography must adopt the methods of science to become a law-seeking, nomothetic discipline. His critique was a major catalyst for the Quantitative Revolution, providing the theoretical framework for geographers to move away from traditional regional synthesis toward spatial analysis and mathematical modeling. This shift fundamentally altered the methodology and scientific status of the modern discipline, pushing it toward identifying universal spatial laws.

234. (D) Lived experience of place
The tradition of spatial analysis focuses on the geometric and locational properties of phenomena across space. It utilizes mathematical models and quantitative techniques to identify universal spatial patterns and laws. Therefore, it is least concerned with the subjective lived experience of place, which is the primary domain of humanistic geography. Spatial analysis prioritizes abstract concepts like distance, connectivity, and interaction patterns rather than personal meanings or emotional bonds. By isolating specific variables to explain the arrangement of cities, industries, and networks, this tradition seeks general principles that apply across boundaries, often ignoring the unique and qualitative human aspects of geographic reality.

235. (C) Mathematical and astronomical geography
Arab geographers made their most significant and lasting contributions in the fields of mathematical and astronomical geography during the Middle Ages. They preserved and built upon the knowledge of the ancient Greeks, improving map accuracy and calculating the Earth's

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275. (C) onset of the quantitative revolution in geography.
The intellectual conflict between Schaefer and Hartshorne served as a pivotal turning point for the discipline in the mid-20th century. By challenging the traditional focus on regional description, the debate acted as a major catalyst for the quantitative revolution. This shift led geographers to adopt more rigorous mathematical and statistical methods, transforming geography into a more analytical and positivist science.

276. (A) The widespread adoption of quantitative methods, GIS, and remote sensing.
Contemporary Indian geography has undergone a significant methodological modernization, moving away from purely descriptive traditions. A key aspect of this shift is the extensive adoption of quantitative techniques and statistical analysis. Furthermore, the field has increasingly integrated advanced technologies such as remote sensing and Geographic Information Systems (GIS), which have become essential tools for conducting sophisticated analytical and problem-oriented geographical research.

277. (D) digital techniques and the creation of thematic maps for planning.
Cartography in India has evolved from traditional manual drafting to the use of sophisticated digital technologies. This transformation is driven by the need for more complex thematic mapping to support national planning and resource management. These modern techniques allow geographers to represent specialized data effectively, providing critical spatial insights for addressing developmental challenges and managing the country's diverse natural and human resources.

278. (B) analytical, applied, and problem-oriented.
Since independence, the nature of geographical inquiry in India has transformed significantly. The discipline has transitioned from a descriptive, gazetteer-style approach to one that is more analytical and applied. Current research is frequently problem-oriented, focusing on addressing real-world socio-economic and environmental issues. This shift reflects a commitment to making the discipline socially relevant and robust in its methodology.

279. (C) Urban and agricultural geography
Indian geographers have developed specialized expertise in several key thematic areas that are vital to the country's development. Notable contributions have been made in urban geography, addressing the challenges of rapid urbanization, and agricultural geography, focusing on food security and rural systems. Other significant areas of research include population studies and environmental management, demonstrating the discipline's diverse and practical applications.

280. (D) There is a growing engagement with Western theories alongside efforts to develop indigenous concepts.
The relationship between contemporary Indian geography and global thought is characterized by a dual focus. There is an increasing engagement with Western theoretical frameworks, such as humanism and behaviouralism. Simultaneously, Indian scholars are actively working to develop indigenous concepts and approaches. This dual effort aims to ensure that geographical research remains theoretically grounded while also being tailored to India's unique realities.

281. (A) The Earth Science tradition.
The Earth Science tradition is one of the foundational pillars of geography, viewing the discipline as a natural science. Its primary focus is on the physical systems and processes of the planet. Consequently, sub-fields such as geomorphology, which studies landforms, and climatology, which analyzes atmospheric patterns, are central components of this tradition, focusing on the Earth's natural environment.

282. (B) Area Studies
The Area Studies tradition, also known as regional studies, is centered on the concept of areal differentiation. This approach involves synthesizing various physical and human phenomena within a specific geographic area to understand what makes it unique. By focusing on the particular characteristics of regions, this tradition seeks to provide a holistic and comprehensive understanding of individual places on Earth.

283. (B) Spatial Analysis
The Spatial Analysis tradition views geography's main purpose as the scientific study of how

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the man-environment tradition, as its primary concern is spatial organization and geometric patterns rather than the influence of nature on human character or human transformation of the landscape through ecological adaptation.

241. (B) Structuralism
A geographer who believes that observable spatial patterns are surface manifestations of deeper economic structures is a proponent of structuralism. This perspective looks beyond individual actions or simple arrangements to identify the underlying social and economic mechanisms, such as capitalism or class struggle, that produce spatial reality. Structuralists argue that individual agency is constrained by these systemic forces, which dictate the organization of space and the resulting social inequalities. By analyzing these hidden structures, they aim to provide a critical explanation for uneven development and social injustice, revealing the systemic forces that produce and maintain the observable spatial and social patterns of the modern world.

242. (C) Statement I is false, but Statement II is true.
Postmodernism in geography represents a major critique of traditional scientific paradigms. The first statement is false because postmodernists explicitly reject the idea of a single, objective truth discovered through traditional science. As correctly noted in the second statement, this perspective celebrates multiplicity, difference, and the deconstruction of grand meta-narratives. Postmodern geographers argue that knowledge is socially constructed and reflects specific power relations. By questioning dominant theories, they aim to reveal the hidden ideologies within geographical knowledge and provide a more diverse understanding of space that recognizes the voices of the marginalized. This approach rejects absolute certainty in favor of a critical, multifaceted interpretation of spatial reality.

243. (B) Humboldt was inductive, Ritter was deductive/teleological.
Alexander von Humboldt and Carl Ritter, the founders of modern geography, utilized fundamentally different methodologies. Humboldt was an explorer who prioritized an inductive, comparative approach, gathering vast amounts of empirical data through direct observation to find universal connections in nature. In contrast, Ritter, an armchair geographer, adopted a deductive and teleological framework, believing the Earth's features were divinely designed to facilitate human development. While Humboldt sought natural unity through evidence, Ritter sought nature's higher purpose. These contrasting methods highlight the diverse philosophical foundations that professionalized the discipline in the early nineteenth century, shaping its future as both a systematic and regional science based on rigorous inquiry.

244. (C) The question of whether geography should be a descriptive (ideographic) or a law-seeking (nomothetic) science.
The Hartshorne-Schaefer debate was a defining intellectual conflict that centered on the fundamental nature and methodology of geography. Richard Hartshorne defended the traditional ideographic view, focusing on areal differentiation and the detailed description of unique regions. Fred K. Schaefer challenged this 'exceptionalism', arguing that geography should adopt the methods of science to become a nomothetic, law-seeking discipline. This debate highlighted the tension between focusing on the uniqueness of places and searching for universal spatial laws. It served as a critical precursor to the Quantitative Revolution, representing the clash over whether the primary goal of geography is descriptive synthesis or the development of predictive, analytical theories.

245. (A) P-3, Q-4, R-2, S-1
Geographical dualisms represent the core divisions and tensions that define the discipline's subject matter, organization, and goals. The physical versus human dualism represents the dichotomy of nature versus society. Regional versus systematic geography concerns the study of places versus topical phenomena. The qualitative versus quantitative divide focuses on analysis through interpretation versus measurement. Finally, the ideographic versus nomothetic dualism addresses the study of unique cases versus the search for general laws. Matching these dualisms to their correct dichotomies clarifies the intellectual structure of geography. These divisions highlight the ongoing methodological

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methodology prioritizes measurement and the use of mathematical tools to test hypotheses. It is a hallmark of the spatial science tradition, which aims to provide objective and generalized explanations of phenomena.

292. (A) a fundamental change in the discipline's basic concepts and practices.
In the context of scientific disciplines like geography, a paradigm shift refers to a profound and fundamental change in the core concepts, methods, and accepted problems of the field. It represents a major transition in how practitioners view and study their subject matter. Such a shift often occurs when a new dominant framework replaces an existing one, completely transforming the discipline's identity.

293. (D) Nomothetic - Establishing general laws.
Within the philosophical dualisms of geography, the nomothetic approach is explicitly linked to the goal of establishing general laws and theories. This contrasts with the ideographic approach, which focuses on describing unique and particular characteristics. Understanding these alignments is crucial for recognizing the different methodological goals that have shaped the evolution of geographical thought and its various scientific paradigms.

294. (B) ideographic to nomothetic approaches.
The paradigm shift from traditional regional geography to spatial science can be described as a transition from an ideographic to a nomothetic approach. This movement represented a change from focusing on the description of unique, individual places to the search for universal laws and general spatial patterns. This shift was a defining characteristic of the quantitative revolution in the mid-20th century.

295. (C) a qualitative and ideographic approach.
A geographer who uses in-depth interviews to explore residents' subjective sense of place is employing a qualitative and ideographic approach. This methodology focuses on capturing descriptive richness and understanding the specific, unique human experiences associated with a particular location. It prioritizes interpretation and the depth of meaning over the statistical measurements or universal laws sought in quantitative, nomothetic research.

296. (D) Humanism
Humanistic geography emerged as a critique of the objective and scientific models of the discipline. This perspective places subjective human experience, consciousness, and the values individuals attach to their environment at the core of its inquiry. By using qualitative methods, humanists seek to understand the lived world and the profound 'sense of place' that individuals develop within their spatial surroundings.

297. (A) Structuralism
Structuralism is a perspective in geography that views visible spatial patterns as the result of underlying, unseen social and economic forces. A geographer using this framework would argue that the distribution of urban features, like slums or industries, is determined by deeper structures such as the capitalist mode of production. This approach focuses on the systemic forces that shape society and space.

298. (B) focuses on the cognitive processes influencing spatial decisions.
While both perspectives emerged from a desire for scientific rigor, Behaviouralism differs from Positivism by emphasizing the role of the human mind. Positivism often seeks universal laws based on observed spatial patterns, whereas Behaviouralism argues that these patterns are the result of cognitive processes. It investigates how mental maps and perceived environments influence the spatial decision-making of individuals and groups.

299. (B) Postmodernism
Postmodernism is characterized by a deep skepticism toward grand theories and universal explanations, often referred to as 'meta-narratives'. This perspective emphasizes the deconstruction of traditional knowledge and the existence of multiple, often conflicting, truths. Postmodern geographers focus on the multiplicity of voices and the relativity of knowledge, arguing that there is no single, objective reality of the world.

300. (A) critiquing patriarchal biases and analyzing gendered spaces.
The feminist perspective in geography is primarily focused on identifying and critiquing the patriarchal biases that have historically existed within the discipline. This critical

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27. A satellite that revisits the same location on Earth every 16 days has a temporal resolution of:
(A) 16 meters
(B) 16 bands
(C) 16 bits
(D) 16 days

28. In the context of satellite imagery, which resolution refers to the size of the smallest feature that can be detected on the ground?
(A) Spectral resolution
(B) Spatial resolution
(C) Temporal resolution
(D) Radiometric resolution

29. Which element of image interpretation refers to the arrangement of objects in an image?
(A) Tone
(B) Texture
(C) Pattern
(D) Shape

30. The relative brightness or color of objects in an image is referred to as:
(A) Shape
(B) Size
(C) Texture
(D) Tone

31. Photogrammetry is the science of obtaining reliable information about physical objects through:
(A) Recording and interpreting photographic images or electromagnetic radiant imagery.
(B) Classifying land use patterns directly through on-site ground field observations.
(C) Creating complex thematic maps using specialized Geographic Information Systems.
(D) Testing statistical hypotheses regarding the distribution of spatial variables.

32. Arrange the following types of resolution in remote sensing based on their primary function:
1. Radiometric
2. Spatial
3. Spectral
4. Temporal

Which sequence correctly describes (Sensitivity to magnitude), (Smallest object size), (Number of bands), (Revisit frequency)?
(A) 1, 2, 3, 4
(B) 2, 1, 4, 3
(C) 4, 3, 2, 1
(D) 1, 4, 3, 2

33. Which type of aerial photograph is taken with the camera axis intentionally tilted with respect to the vertical?
(A) Vertical aerial photograph
(B) Oblique aerial photograph
(C) Orthophotograph
(D) Panchromatic photograph

34. What is a primary objective of Digital Image Processing (DIP) in the context of remote sensing?
(A) To improve the quality of an image and extract useful information.
(B) To define the coordinate system of a raw image.
(C) To measure distances directly from a single aerial photograph.
(D) To select an appropriate map projection.

35. The recent development in remote sensing technology focusing on "Big Data Sharing" is most critical for which application area?
(A) Urban planning and management
(B) Archaeological site discovery
(C) Natural Resources Management in India
(D) Real-time traffic monitoring

36. All of the following are considered elements of air photo and satellite image interpretation except:
(A) Tone and Texture
(B) Shape and Size
(C) Pattern and Association
(D) Bifurcation Ratio and Form Factor

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37. Consider the following statements about remote sensing sensors:
Statement I : Active sensors, like radar, have their own source of illumination.
Statement II : Passive sensors, like a photographic camera, depend on reflected solar energy or emitted thermal energy.
Which of the statement(s) given above is/are correct?
(A) Both Statement I and Statement II are correct.

CHAPTER 09

Geographical Techniques

1. Which of the following best defines spatial data?
(A) Data describing descriptive characteristics or attributes of a geographic feature.
(B) Data identifying the specific location of a feature on the Earth's surface.
(C) Data stored in a tabular format lacking any spatial coordinate information.
(D) Data gathered through qualitative survey methods and narrative interviews.

2. Identify the correct statement regarding non-spatial data.
(A) It describes specific feature characteristics but lacks locational coordinates.
(B) It essentially always includes precise latitude and longitude coordinates.
(C) It is represented exclusively using complex raster-based data formats.
(D) It serves as an alternative technical term for a Digital Elevation Model.

3. A geographer creates a map using varying shades of a single color to represent population density within different administrative districts. Which map-making technique is being used?
(A) Chorochromatic
(B) Isarithmic
(C) Choropleth
(D) Dasymetric

4. Consider the following statements regarding mapping techniques:
Statement I : Isarithmic maps use lines to connect points of equal value.
Statement II : This technique is most suitable for representing discrete data like land use types.
Which of the statement(s) given above is/are correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

5. Which type of map uses lines of varying thickness to show the direction and volume of movement between places?
(A) Choropleth map
(B) Dasymetric map
(C) Flow map
(D) Isarithmic map

6. A map that shows different countries in distinct, contrasting colors is a prime example of which mapping technique?
(A) Dasymetric
(B) Chorochromatic
(C) Isarithmic
(D) Choropleth

7. Consider the following statements about mapping techniques:
Statement I : A Dasymetric map is a refinement of the Choropleth technique.
Statement II : It uses ancillary data to create more accurate zones of homogeneity, rather than being constrained by administrative boundaries.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

8. What is the fundamental data structure of a raster data format in GIS?
(A) A grid of cells where each cell represents a specific characteristic.
(B) A series of points and polygons defined by geographic coordinates.
(C) A table of descriptive attributes linked to various spatial features.
(D) A network of interconnected nodes and links for routing analysis.

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List I: (Term)
P. Central Tendency
Q. Dispersion
R. Sampling
S. Hypothesis Testing
List II: (Description)
1. The spread or variability of data
2. The process of selecting a subset of a population
3. A procedure to make inferences about a population parameter
4. A measure that represents the center of a distribution
Which of the following codes is correct?
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-1, R-2, S-3
(C) P-4, Q-2, R-1, S-3
(D) P-1, Q-4, R-3, S-2

48. The process of selecting a sample from a population where every individual has an equal chance of being chosen is called:
(A) Stratified sampling
(B) Cluster sampling
(C) Simple random sampling
(D) Purposive sampling

49. What is the primary purpose of hypothesis testing in statistics?
(A) To calculate the simple mean and median values of a sample.
(B) To represent raw data graphically using various charts and diagrams.
(C) To measure the degree of correlation between two specific variables.
(D) To make an informed decision about a population using sample data.

50. Consider the following components of the GPS system:
1. Space Segment
2. Ground Control Segment
3. Receiver Segment
4. User Segment (often used interchangeably with Receiver Segment)
5. Photogrammetry Segment
Which of the statements given above correctly identify the three fundamental components of the GPS?
(A) 1, 2, and 3
(B) 2, 3, and 5
(C) 1, 4, and 5
(D) 1, 2, and 5

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51. The Chi-square test is most appropriately used for:
(A) Comparing the means of two different groups.
(B) Testing the significance of a correlation coefficient.
(C) Analyzing the relationship between two categorical variables.
(D) Forecasting future values based on past data.

52. A researcher wants to compare the average crop yield between three different types of fertilizers. Which statistical test would be most suitable for this purpose?
(A) t-test
(B) Chi-square test
(C) Correlation analysis
(D) ANOVA (Analysis of Variance)

53. What does a 't-test' typically evaluate?
(A) The variance among three or more groups.
(B) The difference in means between two groups.
(C) The association between two nominal variables.
(D) The strength and direction of a linear relationship.

54. The analysis of a sequence of data points recorded over time intervals is known as:
(A) Correlation Analysis
(B) Principal Component Analysis
(C) Time Series Analysis
(D) Cluster Analysis

55. A correlation coefficient of -0.9 indicates:
(A) A strong positive linear relationship.
(B) A weak positive linear relationship.
(C) A weak negative linear relationship.
(D) A strong negative linear relationship.

56. In a simple linear regression analysis, what does the regression equation allow you to do?
(A) Predict the value of a dependent variable based on an independent variable.
(B) Test for differences in means between multiple groups.

for elevation models.
(D) The smallest individual cell or pixel within a satellite-based image.

19. Match List I with List II regarding map projections:
List I: (Projection Property)
P. Equal-Area (Equivalent)
Q. Conformal (Orthomorphic)
R. Equidistant
S. Azimuthal (Zenithal)
List II: (Preserved Characteristic)
1. Preserves shape of small areas
2. Preserves true direction from a central point
3. Preserves area of features
4. Preserves distance from one or two points to all other points
Which of the following codes is correct?
(A) P-3, Q-1, R-4, S-2
(B) P-1, Q-3, R-2, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-2, Q-1, R-4, S-3

20. A GIS application designed to help city planners evaluate various development scenarios by integrating spatial data and models is an example of a:
(A) Digital Elevation Model
(B) Global Positioning System
(C) Thematic Cartography tool
(D) Spatial Decision Support System

21. Which GIS application is primarily focused on creating maps that visualize a specific theme or subject, such as population density or land cover?
(A) Spatial Decision Support System
(B) Georeferencing
(C) Thematic Cartography
(D) Database Conversion

22. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Georeferencing is a fundamental step before any spatial analysis can be performed on a scanned map or raw satellite image.
Reason (R) : Without a defined coordinate system, the spatial relationships between different data layers cannot be accurately established.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

23. Which of the following is NOT a part of the electromagnetic spectrum commonly used in remote sensing?
(A) Visible light
(B) Infrared radiation
(C) Microwaves
(D) Ultrasonic waves

24. A device mounted on an aircraft or satellite to collect data about the Earth's surface is known as a:
(A) Sensor
(B) Platform
(C) Datum
(D) Receiver

25. Consider the following statements about remote sensing:
1. A sensor is the device used to detect electromagnetic radiation.
2. A platform is the vehicle that carries the sensor, such as a satellite or airplane.
3. The electromagnetic spectrum is the range of all possible frequencies of electromagnetic radiation.
4. Remote sensing involves making physical contact with the object being studied.
5. Passive sensors provide their own source of energy for illumination.
Which of the statements given above are correct?
(A) 1, 2, 3, 4, and 5
(B) 1, 2, and 3 only
(C) 2, 4, and 5 only
(D) 1, 3, and 5 only

26. The ability of a remote sensing system to distinguish between different wavelengths of the electromagnetic spectrum is called:
(A) Spectral resolution
(B) Spatial resolution
(C) Temporal resolution
(D) Radiometric resolution

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approach examines how gender relations are spatialized and how space itself is gendered. By analyzing these dynamics, feminist geographers seek to understand how social inequalities are reflected in and reinforced by the organization of the environment.

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(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

38. The GPS segment that consists of a constellation of satellites orbiting the Earth is known as the:
(A) Ground Control Segment
(B) Receiver Segment
(C) Space Segment
(D) User Segment

39. What is the main function of the Ground Control Segment in the GPS?
(A) To receive and use signals for navigation and positioning.
(B) To orbit the Earth and transmit radio signals.
(C) To process satellite images for thematic mapping.
(D) To track the satellites, monitor their transmissions, and upload data.

40. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : A minimum of four satellites are required for a GPS receiver to determine an accurate three-dimensional position (latitude, longitude, altitude) and time.
Reason (R) : The fourth satellite is necessary to correct for the receiver's clock error, in addition to solving for the three spatial coordinates.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

41. Which of the following represents the Receiver Segment of the GPS?
(A) The network of master control stations and monitor stations on Earth.
(B) Any device, such as a smartphone or handheld unit, that records and processes signals from the satellites.
(C) The constellation of satellites broadcasting navigation signals.
(D) The software used to post-process GPS data for higher accuracy.

42. Consider the following statements about GPS:
1. The Space Segment consists of orbiting satellites.
2. The Ground Control Segment monitors and controls the satellites.
3. The Receiver Segment is the user's GPS device.
4. GPS applications are limited to military use only.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 2, 3 and 4
(C) 1, 2 and 3
(D) 1 and 4 only

43. Which of the following is NOT a direct application of GPS technology?
(A) Vehicle navigation and tracking
(B) Geotagging photos with location data
(C) Surveying and mapping
(D) Measuring the spectral signature of vegetation

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44. A measure of central tendency that represents the most frequently occurring value in a dataset is the:
(A) Mean
(B) Median
(C) Range
(D) Mode

45. The measure of dispersion that is calculated as the square root of the variance is known as the:
(A) Standard Deviation
(B) Range
(C) Quartile Deviation
(D) Mean Deviation

46. Which measure of central tendency is most affected by extreme values or outliers in a dataset?
(A) Median
(B) Mean
(C) Mode
(D) Geometric Mean

47. Match List I with List II regarding statistical concepts:

(C) The ratio of first-order streams to second-order streams.
(D) The ratio of the basin area to the square of its perimeter.

66. A high value of drainage density in a basin would typically suggest:
(A) Highly resistant, permeable surface material.
(B) Sparse vegetation and impermeable surface material.
(C) A flat terrain with very few tributaries.
(D) A very elongated basin shape.

67. Consider the following steps in a typical GIS-based spatial analysis workflow:
1. Data Acquisition
2. Georeferencing
3. Analysis and Modeling
4. Data Output and Visualization

Which sequence correctly describes the logical order of these steps?
(A) 1, 2, 3, 4
(B) 2, 1, 4, 3
(C) 1, 3, 2, 4
(D) 3, 1, 2, 4

68. What is drainage frequency?
(A) The number of stream segments per unit area.
(B) The total length of streams per unit area.
(C) The ratio of streams of one order to the next.
(D) The time interval between flood peaks.

69. Basin Circularity Ratio is a morphometric parameter that provides an index of:
(A) The density of stream channels within the basin.
(B) The overall slope of the basin.
(C) The difference between the highest and lowest elevation in the basin.
(D) The elongation of a drainage basin.

70. A Form Factor (Ff) value close to 1.0 for a drainage basin would indicate that the basin is:
(A) Nearly circular.
(B) Highly elongated.
(C) Characterized by high relief.
(D) Poorly drained.

71. Match List I with List II regarding morphometric parameters:
List I: (Parameter)
P. Drainage Density
Q. Bifurcation Ratio
R. Circularity Ratio
S. Drainage Frequency
List II: (Formula/Concept)
1. Ratio of number of streams of one order to the next
2. Total stream length / Basin area
3. Index of basin shape (elongation)
4. Total number of streams / Basin area

Which of the following codes is correct?
(A) P-1, Q-2, R-4, S-3
(B) P-2, Q-1, R-3, S-4
(C) P-2, Q-3, R-1, S-4
(D) P-3, Q-1, R-4, S-2

72. A graphical representation of the cross-section of a land surface along a specific line is known as a:
(A) Hypsographic Curve
(B) Profile
(C) Clinographic Curve
(D) Altimetric Frequency Graph

73. What is the primary purpose of slope analysis in geomorphology?
(A) To determine the age of a landform.
(B) To classify and quantify the steepness of the terrain.
(C) To measure the length of river channels.
(D) To calculate the circularity of a drainage basin.

74. A Clinographic Curve represents:
(A) The relationship between the slope of the ground and the percentage of area at that slope.
(B) The area of a basin below or above a certain elevation.
(C) The frequency distribution of different elevations within a region.
(D) A cross-sectional view of the terrain.

75. Consider the following statements about morphometric analysis:
1. Drainage density reflects the texture of the drainage network.
2. Bifurcation ratio is a measure of basin

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(C) Group similar observations into clusters.
(D) Determine if observed frequencies match expected frequencies.

57. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : A correlation coefficient of 0 indicates that there is no relationship between two variables.
Reason (R) : Correlation analysis only measures the strength of a linear relationship, so a value of 0 means there is no linear association, but a non-linear relationship might still exist.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

58. What is a primary goal of creating a composite index?
(A) To combine multiple individual indicators into a single score for comparison.
(B) To analyze a single variable over a period of time.
(C) To test a null hypothesis against an alternative hypothesis.
(D) To reduce the dimensionality of data by creating principal components.

59. The process of transforming indicators measured on different scales and units to a common scale before combining them into an index is known as:
(A) Hypothesis testing
(B) Time series analysis
(C) Making indicators scale-free
(D) Cluster analysis

60. Principal Component Analysis (PCA) is a multivariate technique used for:
(A) Grouping similar objects into distinct categories or clusters based on behavior.
(B) Predicting a dependent variable value based on multiple independent variables.
(C) Comparing the mean values of several groups to check for statistical significance.
(D) Reducing dataset dimensionality while retaining the majority of the variance.

61. Consider the following statistical techniques:
1. Chi-square test
2. t-test
3. ANOVA
4. Correlation Analysis
5. Cluster Analysis

Which of these are typically used for hypothesis testing?
(A) 1, 2, and 3 only
(B) 1, 2, 4, and 5
(C) 3, 4, and 5 only
(D) 1, 2, 3, 4, and 5

62. A market researcher wants to segment customers into distinct groups based on their purchasing behavior. Which statistical technique would be most appropriate for this task?
(A) Regression Analysis
(B) Cluster Analysis
(C) Time Series Analysis
(D) t-test

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63. Which method of stream ordering assigns the number '1' to all fingertip tributaries and increases the order only when two streams of the same order join?
(A) Horton's method
(B) Shreve's method
(C) Strahler's method
(D) Gravelius's method

64. What does the Bifurcation Ratio (Rb) in morphometric analysis describe?
(A) The relationship between the length of streams of a certain order and the next higher order.
(B) The total length of streams per unit area of the drainage basin.
(C) The number of stream segments per unit area of the drainage basin.
(D) The ratio of the number of stream segments of a given order to the number of segments of the next higher order.

65. Drainage density is calculated as:
(A) The total length of all streams in a basin divided by the area of that basin.
(B) The total number of streams divided by the basin area.

9. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Vector data models are generally preferred for representing discrete features like roads, rivers, and political boundaries.
Reason (R) : Vector data uses points, lines, and polygons, which allow for high precision and clear definition of feature boundaries.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

10. A file containing the names of cities, their population, and literacy rates, which is linked to a separate spatial file, is an example of what?
(A) An attribute data format
(B) Raster data format
(C) A Digital Elevation Model
(D) A coordinate system

11. Which of the following is an INCORRECT statement about data representation on maps?
(A) Pie diagrams are effective for showing proportions of a whole for a specific area.
(B) Line graphs are suitable for showing trends or changes over time.
(C) Bar diagrams are used to compare quantities among different categories.
(D) Choropleth maps represent continuous phenomena such as terrain elevation.

12. Consider the following statements regarding GIS data formats:
1. Raster data is represented by a matrix of cells or pixels.
2. Vector data represents geographic features with points, lines, and polygons.
3. Attribute data is non-spatial information that describes the features.
4. A satellite image is a typical example of vector data.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 2, 3 and 4
(C) 1, 2 and 3
(D) 1 and 4 only

13. The process of transforming data from one format to another within a GIS, such as converting a raster image to a vector file, is known as a _____ function.
(A) analysis
(B) editing
(C) conversion
(D) georeferencing

14. Modifying the shape or location of a polygon feature in a GIS to correct an error falls under which category of GIS function?
(A) Analysis
(B) Conversion
(C) Data representation
(D) Editing

15. What is the primary purpose of a Digital Elevation Model (DEM)?
(A) To represent the surface topography or terrain.
(B) To store attribute information about land use.
(C) To function as a coordinate system for georeferencing.
(D) To display thematic information using colors.

16. Which of the following GIS functions is NOT primarily considered an 'analysis' function?
(A) Buffering around a point feature
(B) Changing the symbology of a map layer
(C) Overlaying two different map layers
(D) Calculating the shortest path in a network

17. The process of assigning a real-world coordinate system to a raw image or map is called:
(A) Digital Image Processing
(B) Georeferencing
(C) Photogrammetry
(D) Thematic Cartography

18. In the context of georeferencing, what is a 'Datum'?
(A) A mathematical model of Earth used as a coordinate reference frame.
(B) The process of projecting the spherical Earth onto a flat map plane.
(C) A specific type of raster data format utilized

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shape.
3. Form factor indicates the degree of elongation of a basin.
4. Stream ordering is a method to classify the hierarchy of river channels.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 3 and 4
(D) 1, 2 and 4

76. A Hypsographic Curve is a graphical representation of:
(A) The distribution of slopes in a drainage basin.
(B) The number of stream segments at different orders.
(C) The change in a variable over time.
(D) The cumulative frequency of elevations in an area.

77. Which graphical method plots the frequency of occurrence of different elevation values within a given area?
(A) Altimetric Frequency Graph
(B) Clinographic Curve
(C) Hypsographic Curve
(D) Longitudinal Profile

78. A researcher wants to show the proportion of the Earth's surface at or above a given elevation. Which curve would be the most appropriate to construct?
(A) Clinographic Curve
(B) Altimetric Frequency Graph
(C) Hypsographic Curve
(D) Scatter plot

79. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Dasymetric mapping provides a more realistic representation of data distribution than simple choropleth mapping.
Reason (R) : It utilizes ancillary information to refine boundaries, which are not necessarily administrative, resulting in more homogenous mapping units.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

80. A pie diagram is best used to represent which type of information on a map?
(A) The change in temperature over a year.
(B) The volume of traffic between two cities.
(C) The percentage breakdown of land use types within a single district.
(D) The elevation contours of a mountainous region.

81. Which data format in GIS is more suitable for representing continuous phenomena like elevation or temperature?
(A) Raster
(B) Vector
(C) Attribute
(D) Choropleth

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82. The process of modifying or updating the spatial and attribute data in a GIS database is broadly termed as:
(A) Conversion
(B) Georeferencing
(C) Analysis
(D) Editing

83. Consider the following statements about remote sensing resolution:
1. Spatial resolution determines the smallest object that can be seen.
2. Temporal resolution refers to the frequency of data acquisition over the same area.
3. Spectral resolution is the ability to differentiate between wavelength intervals.
4. Radiometric resolution is the sensitivity of sensors to differences in signal strength.
5. High spatial resolution always means low temporal resolution.

Which of the statements given above are correct?
(A) 1, 2, 3, and 4
(B) 1, 2, and 5 only
(C) 3, 4, and 5 only
(D) 1, 2, 3, 4, and 5

84. The science of measuring from photographs, especially aerial photographs, is called:
(A) Georeferencing

(B) Systematic sampling
(C) Cluster sampling
(D) Stratified sampling

144. In regression analysis, the variable that is being predicted is called the:
(A) Dependent variable
(B) Independent variable
(C) Control variable
(D) Categorical variable

145. Cluster analysis is a technique that aims to:
(A) Predict future trends based on past data.
(B) Group a set of objects in such a way that objects in the same group are more similar to each other than to those in other groups.
(C) Test the difference between group averages.
(D) Reduce the number of variables in a dataset.

146. Match List I with List II regarding statistical techniques:
List I: (Technique)
P. t-test
Q. ANOVA
R. Chi-square test
S. Regression Analysis
List II: (Purpose)
1. Compare means of 3+ groups
2. Test association between categorical variables
3. Predict a dependent variable
4. Compare means of 2 groups
Which of the following codes is correct?
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-2, S-3
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-4, S-3

147. A very low Bifurcation Ratio (close to 2) in a drainage basin generally indicates:
(A) A structurally complex and highly dissected terrain.
(B) A basin that is not very elongated.
(C) Very high drainage density.
(D) A geologically stable area with uniform lithology and gentle slopes.

148. The Form Factor of a basin is calculated by dividing the basin area by:
(A) The square of the basin length.
(B) The basin perimeter.
(C) The total length of streams.
(D) The number of first-order streams.

149. The 'S' bend shape of a typical hypsographic curve represents:
(A) Youthful, mature, and old stages of erosion from top to bottom.
(B) A landscape that is uniform in elevation.
(C) Youthful, mature, and old stages of erosion from bottom to top.
(D) An error in data collection.

150. Consider the following characteristics of a map:
1. It uses shades of color within predefined boundaries.
2. The data represented is statistical in nature (e.g., density, percentage).
3. Darker shades typically represent higher values.
4. It is suitable for representing data like population density.
Which map type is characterized by the statements given above?
(A) Isarithmic Map
(B) Flow Map
(C) Choropleth Map
(D) Chorochromatic Map

151. Which of the following is a primary consideration when choosing a map projection?
(A) The color scheme to be used on the map.
(B) The type of computer used to create the map.
(C) The geographic location and extent of the area to be mapped.
(D) The number of features to be displayed.

152. A GIS overlay operation is a type of:
(A) Editing function
(B) Conversion function
(C) Data input function
(D) Analysis function

153. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Active remote sensing systems can acquire imagery at any time, day or night.
Reason (R) : They generate their own illumination and do not depend on solar radiation.

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objects.
(C) The absolute and relative size of objects.
(D) The frequency of change and arrangement of tones in a particular area.

95. In hypothesis testing, what is a Type I error?
(A) Rejecting a true null hypothesis.
(B) Failing to reject a false null hypothesis.
(C) Correctly rejecting a false null hypothesis.
(D) Correctly failing to reject a true null hypothesis.

96. Match List I with List II regarding remote sensing concepts:
List I: (Concept)
P. Sensor
Q. Platform
R. Spatial Resolution
S. Spectral Resolution
List II: (Example/Definition)
1. Landsat satellite
2. Thematic Mapper (TM)
3. 30 meters
4. Number of spectral bands
Which of the following codes is correct?
(A) P-2, Q-1, R-3, S-4
(B) P-1, Q-2, R-3, S-4
(C) P-2, Q-1, R-4, S-3
(D) P-4, Q-3, R-2, S-1

97. An analyst studying changes in a city's green cover over the last 20 years using satellite images taken every two years is primarily concerned with which type of resolution?
(A) Spatial
(B) Temporal
(C) Spectral
(D) Radiometric

98. The GPS 'Receiver Segment' is also known as the:
(A) User Segment
(B) Space Segment
(C) Control Segment
(D) Datum Segment

99. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Principal Component Analysis (PCA) is often used as a preliminary step before cluster analysis.
Reason (R) : PCA can reduce the number of variables and remove multicollinearity, which can improve the performance and interpretation of the subsequent clustering.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

100. A Form Factor value of 0.25 for a drainage basin suggests that the basin is:
(A) Almost perfectly circular.
(B) Square in shape.
(C) Very small in area.
(D) Highly elongated and narrow.

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101. Which morphometric curve is also known as the area-height curve?
(A) Clinographic Curve
(B) Altimetric Frequency Graph
(C) Hypsographic Curve
(D) Longitudinal Profile

102. Consider the following statements regarding mapping techniques:
1. Isarithmic maps are ideal for showing population density by district.
2. Flow maps use lines of proportional thickness to show movement.
3. Chorochromatic maps use a range of shades of one color.
4. Choropleth maps use statistical data aggregated over predefined units like counties or states.
Which of the statements given above are correct?
(A) 1 and 3 only
(B) 2 and 4 only
(C) 1, 2 and 3
(D) 2, 3 and 4

103. The term 'attribute data' in GIS refers to:
(A) The coordinate information of a feature.
(B) The cell values in a raster grid.
(C) The projection system used for a map.
(D) Descriptive, non-spatial information about a feature.

104. What is the fundamental difference between vector and raster data models?
(A) Vector models use uniform grid cells, while raster models use discrete coordinates.
(B) Vector models represent the world using discrete objects, while raster models use grids.
(C) Vector models are used for continuous data, while raster models are for discrete data.
(D) Vector models represent a newer technological advancement than traditional raster models.

105. A spatial decision support system (SDSS) integrates which of the following components?
(A) A database management system and modeling capabilities within a GIS framework.
(B) Only remote sensing data and GPS coordinates.
(C) Only statistical hypothesis testing tools.
(D) Only map-making and cartographic design tools.

106. In remote sensing, what does radiometric resolution determine?
(A) The number of spectral bands a sensor can record.
(B) The ability of a sensor to discriminate very slight differences in energy.
(C) The revisit period of a satellite.
(D) The size of a pixel on the ground.

107. Which of the following best describes 'sampling procedure'?
(A) The method used to test a hypothesis.
(B) The calculation of mean, median, and mode.
(C) The overall process and plan for selecting a sample from a population.
(D) The analysis of data collected over time.

108. Arrange the following events in the history of remote sensing in chronological order:
1. Launch of Landsat 1 (ERTS-1)
2. Widespread use of aerial photography in World War I
3. Development of high-resolution commercial satellites (e.g., IKONOS)
4. Beginning of the use of 'Big Data' platforms for Earth observation

(A) 1, 2, 3, 4
(B) 2, 1, 3, 4
(C) 2, 3, 1, 4
(D) 1, 3, 2, 4

109. A scatter plot showing data points clustered from the upper-left to the lower-right corner would indicate:
(A) A negative correlation.
(B) A positive correlation.
(C) No correlation.
(D) A perfect correlation of +1.0.

110. Which morphometric parameter is a dimensionless measure of the shape of a basin, calculated as the ratio of basin area to the area of a circle having the same perimeter as the basin?
(A) Form Factor
(B) Bifurcation Ratio
(C) Drainage Density
(D) Basin Circularity Ratio

111. An Altimetric Frequency Graph is essentially a:
(A) Cumulative frequency curve.
(B) Histogram of elevation data.
(C) Plot of slope against area.
(D) Cross-section of a river valley.

112. The key difference between a clinographic curve and a hypsographic curve is that:
(A) The clinographic curve relates elevation to area, while the hypsographic curve relates slope to area.
(B) The clinographic curve shows a profile, while the hypsographic curve shows frequency.
(C) The clinographic curve relates slope to area, while the hypsographic curve relates elevation to area.
(D) The clinographic curve is for large areas, while the hypsographic curve is for small basins.

113. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : In Strahler's stream ordering system, the joining of a first-order stream with a second-order stream results in a second-order stream.
Reason (R) : The stream order increases only

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when two streams of the same order intersect.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

114. The process of converting scanned paper maps into digitally usable GIS layers often involves georeferencing and then digitizing. This falls under which GIS functions?
(A) Analysis and Modeling
(B) Conversion and Editing
(C) Application and Support
(D) Database Management only

115. A key benefit of using Big Data sharing platforms for natural resource management is:
(A) The ability to use a single type of statistical test for all analyses.
(B) The replacement of all ground-based surveys with satellite data.
(C) The integration of vast, multi-temporal, and multi-sensor data for comprehensive monitoring.
(D) The elimination of the need for GIS software.

116. Consider the following pairs:
1. Spatial Data - Coordinates of a city
2. Non-spatial Data - Population of a city
3. Raster Data - A road network file
4. Vector Data - A satellite image of land cover

Which of the pairs given above are correctly matched?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) 1, 2, 3 and 4

117. What type of map is created by joining points of equal value with lines?
(A) Choropleth
(B) Chorochromatic
(C) Flow Map
(D) Isarithmic

118. Which statement is INCORRECT regarding map projections?
(A) Flat maps can preserve shape, area, distance, and direction simultaneous properties.
(B) All map projections introduce some form of distortion.
(C) A conformal projection preserves local shapes.
(D) An equal-area projection preserves the relative size of features.

119. Match List I with List II regarding GIS and RS terms:
List I: (Term)
P. DEM
Q. GPS
R. Datum
S. DIP
List II: (Primary Function)
1. Digital Image Processing
2. A reference surface for coordinate systems
3. A representation of terrain elevation
4. A system for determining position on Earth

Which of the following codes is correct?
(A) P-4, Q-3, R-1, S-2
(B) P-3, Q-4, R-2, S-1
(C) P-3, Q-2, R-4, S-1
(D) P-1, Q-4, R-2, S-3

120. In the context of remote sensing, what is an active sensor?
(A) A sensor that only works during the daytime.
(B) A sensor that relies on the sun's energy reflected from the target.
(C) A sensor that provides its own source of energy to illuminate the target.
(D) A sensor with very high spatial resolution.

121. The "Elements of Air Photo and Satellite Image Interpretation" include all of the following EXCEPT:
(A) ANOVA, t-test
(B) Shape, Size, Tone
(C) Texture, Pattern, Association
(D) Shadow, Site

122. The development of 'Big Data' sharing for remote sensing applications facilitates:
(A) Analysis of small, localized study areas only.
(B) The use of single, low-resolution images.
(C) The complete automation of image interpretation, removing the need for human analysts.
(D) Large-scale, long-term environmental

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uniform within each areal unit.
(C) Is only suitable for showing movement between places.
(D) Can only represent continuous data like elevation.

164. What is the fundamental principle of georeferencing?
(A) To link non-spatial attribute data to spatial features.
(B) To convert vector data into raster data.
(C) To assign ground coordinates to the pixels or features of a map or image.
(D) To create a thematic map for visualization.

165. In a GIS, a "Spatial Decision Support System" is an application designed to:
(A) Solely create high-quality cartographic outputs.
(B) Store and manage large volumes of spatial data.
(C) Provide real-time positioning information.
(D) Integrate spatial data and analytical models to support complex decisions.

166. A remote sensing satellite with 256 levels of gray scale sensitivity (8-bit) has a higher _____ than a satellite with 64 levels (6-bit).
(A) Radiometric resolution
(B) Spatial resolution
(C) Spectral resolution
(D) Temporal resolution

167. Arrange the following electromagnetic wavelengths from shortest to longest:
1. Infrared
2. Visible Light
3. Microwave
(A) 1, 2, 3
(B) 2, 1, 3
(C) 3, 1, 2
(D) 2, 3, 1

168. An incorrect pairing of a GPS segment and its function is:
(A) Space Segment - Transmits navigation signals.
(B) Ground Control Segment - Monitors satellite health and orbits.
(C) Space Segment - Processes satellite imagery.
(D) Receiver Segment - Processes signals to determine position.

169. If the median of a dataset is much higher than its mean, the distribution is likely:
(A) Symmetrical.
(B) Negatively skewed.
(C) Positively skewed.
(D) Bimodal.

170. Which of the following is NOT an assumption for conducting a standard one-way ANOVA?
(A) The data must be categorical.
(B) The samples are independent.
(C) The populations from which samples are drawn are normally distributed.
(D) The populations have equal variances (homogeneity of variances).

171. Making indicators scale-free is a crucial step in computing a composite index because:
(A) It reduces the number of indicators needed.
(B) It ensures that indicators with large absolute values do not dominate the index.
(C) It automatically assigns weights to each indicator.
(D) It tests the statistical significance of the index.

172. A geographer uses statistical methods to group several neighborhoods based on variables like income, house price, and education level. This is an application of:
(A) Time Series Analysis
(B) Cluster Analysis
(C) t-test
(D) Correlation Analysis

173. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Drainage density is influenced by the climate and lithology of a basin.
Reason (R) : Regions with high rainfall and impermeable rocks tend to develop a high drainage density.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.

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erosion with steep-sided valleys.
(C) The landscape is a mature, low-relief plain.
(D) The landscape is dominated by a few high peaks surrounded by flat plains.

133. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : A GIS is merely a tool for making digital maps.
Reason (R) : The core strength of a GIS lies in its ability to perform complex spatial analysis by integrating different data layers.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

134. Which of the following is an example of non-spatial data?
(A) The coordinates of a weather station.
(B) A table of annual rainfall measurements for a weather station.
(C) A polygon representing a national park boundary.
(D) A line feature representing a river.

135. A map showing migration from various states to a major city, with arrows of different widths representing the number of migrants, is a:
(A) Flow map
(B) Choropleth map
(C) Dasymetric map
(D) Isarithmic map

136. Which of the following is a key advantage of the Dasymetric mapping technique over Choropleth?
(A) It is simpler and quicker to produce.
(B) It does not require any statistical data.
(C) It maps data distribution accurately by incorporating ancillary information.
(D) It is designed to represent continuous data like temperature.

137. Which of these is NOT a function of GIS?
(A) Conversion
(B) Editing
(C) Analysis
(D) Sensor calibration

138. The World Geodetic System 1984 (WGS84) is a widely used example of a:
(A) Map projection
(B) Raster file format
(C) Datum
(D) Sensor type

139. Arrange the following steps for creating a composite index in the correct order:
1. Selecting individual indicators
2. Making indicators scale-free (Normalization)
3. Aggregating the indicators into a single value
4. Weighting the indicators (if necessary)

(A) 1, 4, 3, 2
(B) 1, 2, 4, 3
(C) 2, 1, 4, 3
(D) 3, 1, 2, 4

140. Which of the following are the primary components of a GPS system?
(A) Sensor, Platform, and Resolution
(B) Mean, Median, and Mode
(C) Points, Lines, and Polygons
(D) Space, Ground Control, and Receiver Segments

141. The standard deviation is a measure of:
(A) The central value of a dataset.
(B) The spread of data around the mean.
(C) The most frequent value in a dataset.
(D) The relationship between two variables.

142. A null hypothesis (H0) in a t-test usually states that:
(A) There is a significant difference between the two group means.
(B) One group mean is larger than the other.
(C) There is no significant difference between the two group means.
(D) The sample size is too small.

143. If a geographer divides a study area into urban, suburban, and rural zones and then selects a random sample of households from each zone, what sampling procedure is being used?
(A) Simple random sampling

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(B) Thematic Cartography
(C) Digital Image Processing
(D) Photogrammetry

85. In the context of remote sensing, what are 'platforms'?
(A) The vehicles, such as satellites or aircraft, that carry the sensors.
(B) The devices that detect and record energy.
(C) The ground stations that receive the data.
(D) The software used for image analysis.

86. Which measure of inequality is commonly used in geographical studies to show the distribution of a resource or phenomenon?
(A) Standard Deviation
(B) Gini Coefficient
(C) Correlation Coefficient
(D) Mean

87. Arrange the following statistical tests in order of the number of group means they are typically designed to compare, from few to many:
1. ANOVA
2. t-test
3. Post-hoc tests following ANOVA

(A) 2, 1, 3
(B) 1, 2, 3
(C) 2, 3, 1
(D) 3, 2, 1

88. If a regression analysis yields an R-squared value of 0.81, what does this signify?
(A) 81% of the predictions will be correct.
(B) The correlation between the variables is 0.81.
(C) There is an 81% chance that the null hypothesis is false.
(D) 81% of the variance in the dependent variable is explained by the independent variable(s).

89. Identifying the correct pair of a statistical test and its application:
(A) ANOVA - Comparing the means of three or more groups.
(B) Chi-square test - Comparing the means of two independent groups.
(C) t-test - Analyzing the association between two categorical variables.
(D) Correlation - Predicting a value based on another variable's value.

90. All of the following are measures of dispersion EXCEPT:
(A) Range
(B) Median
(C) Standard Deviation
(D) Variance

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91. What is the main difference between a Bar Diagram and a Line Graph for data representation?
(A) Bar diagrams show parts of a whole, while line graphs show comparisons.
(B) Bar diagrams use lines, while line graphs use rectangular bars.
(C) Bar diagrams compare discrete categories, while line graphs show continuous change over time.
(D) There is no functional difference; the choice is purely aesthetic.

92. Consider the following statements regarding mapping:
Statement I : A coordinate system is essential for georeferencing.
Statement II : A map projection is a method to represent the curved surface of the Earth on a flat plane.
Which of the statement(s) given above is/are correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

93. A DEM is a specific type of which GIS data format?
(A) Vector
(B) Attribute table
(C) Raster
(D) Network

94. The 'texture' in satellite image interpretation refers to:
(A) The overall shape of a large feature.
(B) The location of an object in relation to other

Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

154. Identifying the correct statement about aerial photographs:
(A) All aerial photographs are taken with the camera pointing perfectly vertically.
(B) Oblique aerial photographs provide a more natural, side-view perspective.
(C) Vertical aerial photographs are free from all geometric distortions.
(D) Photogrammetry is the art of coloring aerial photographs.

155. What is the role of hypothesis testing in the scientific method?
(A) To prove a theory with absolute certainty.
(B) To describe the central tendency of a dataset.
(C) To provide a framework for making population decisions based on sample data.
(D) To visualize data in graphical form.

156. A correlation coefficient of +1.0 signifies:
(A) A perfect negative linear relationship.
(B) No linear relationship.
(C) A weak positive linear relationship.
(D) A perfect positive linear relationship.

157. The computation of a composite index like the Human Development Index (HDI) involves which of the following processes?
(A) Selection, normalization, and aggregation of multiple indicators.
(B) Time series analysis and forecasting.
(C) Testing the difference in means between countries.
(D) Grouping countries into clusters based on a single variable.

158. Which of the following is NOT a morphometric parameter related to a drainage basin?
(A) Bifurcation Ratio
(B) Standard Deviation
(C) Form Factor
(D) Drainage Density

159. Consider the following statements about statistical analysis:
1. A t-test is used to compare the means of two groups.
2. ANOVA is used to compare the means of two or more groups.
3. A Chi-square test is suitable for analyzing categorical data.
4. Correlation analysis measures the strength of a linear relationship between two variables.
5. Principal Component Analysis is a form of hypothesis testing.

Which of the statements given above are correct?
(A) 1, 2, and 3 only
(B) 1, 2, 3, and 4 only
(C) 3, 4, and 5 only
(D) All of the above

160. A high value for the Bifurcation Ratio (e.g., > 5) in a drainage basin might indicate:
(A) A region with steep slopes and high structural disturbance, leading to a dense, well-developed drainage network.
(B) A very flat, uniform terrain.
(C) A circular basin shape.
(D) Impermeable bedrock with low drainage density.

161. A clinographic curve is plotted with:
(A) Cumulative elevation on the Y-axis and cumulative area on the X-axis.
(B) Elevation on the Y-axis and horizontal distance on the X-axis.
(C) Angle of slope on the Y-axis and cumulative percentage of area on the X-axis.
(D) Frequency of elevation on the Y-axis and elevation class on the X-axis.

162. Which of the following sources of geographic information is inherently spatial?
(A) A list of city populations.
(B) A historical text describing a region.
(C) A table of economic statistics by country name.
(D) A satellite image.

163. The primary limitation of a Choropleth map is that it:
(A) Cannot represent quantitative data.
(B) Suggests that the mapped phenomenon is

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monitoring and resource management.

123. Consider the following statements about GPS components:
1. The Space Segment orbits the Earth and transmits signals.
2. The Receiver Segment consists of ground stations that track the satellites.
3. The Ground Control Segment is the device used by a hiker for navigation.
4. The three segments work independently of each other.

Which of the statements given above are correct?
(A) 1 only
(B) 1 and 2
(C) 2 and 3
(D) 1 and 4

124. The mean, median, and mode are all measures of:
(A) Dispersion
(B) Correlation
(C) Central Tendency
(D) Association

125. A researcher is studying the relationship between income level (low, middle, high) and mode of transport (public, private). Which statistical test is most appropriate?
(A) t-test
(B) ANOVA
(C) Regression Analysis
(D) Chi-square test

126. A time series analysis would be most suitable for which of the following research questions?
(A) What is the trend in annual rainfall in a region over the last 50 years?
(B) Are the average test scores of two classes significantly different?
(C) Is there a relationship between elevation and temperature?
(D) How can we group cities based on their demographic characteristics?

127. If a researcher wants to predict a student's final exam score based on the number of hours they studied, which analysis should be used?
(A) Cluster Analysis
(B) Regression Analysis
(C) Chi-square test
(D) Time Series Analysis

128. What is the purpose of Principal Component Analysis (PCA) in geographical research?
(A) To test for significant differences between the means of multiple groups.
(B) To reduce a large set of correlated variables into a smaller set of uncorrelated components.
(C) To map the flow of goods between regions.
(D) To order streams in a drainage basin.

129. Consider the following statements about morphometric analysis:
1. Drainage density is the total stream length divided by basin area.
2. Drainage frequency is the total number of streams divided by basin area.
3. Bifurcation ratio relates the number of streams of different orders.
4. Basin circularity ratio and form factor are measures of basin elongation.
5. A high drainage density often indicates impermeable rock and steep slopes.

Which of the statements given above are correct?
(A) 1, 2, and 4 only
(B) 2, 3, 4, and 5 only
(C) 1, 3, and 5 only
(D) 1, 2, 3, 4, and 5

130. A profile that shows the elevation along the path of a river from its source to its mouth is called a:
(A) Transverse profile
(B) Serial profile
(C) Composite profile
(D) Longitudinal profile

131. The slope analysis performed in geography typically involves calculating:
(A) The gradient, or degree of steepness, of the ground surface.
(B) The age of the slope.
(C) The chemical composition of the slope material.
(D) The bifurcation ratio of the slope.

132. What does a hypsographic curve with a steep slope at lower elevations and a gentle slope at higher elevations indicate?
(A) Most of the area is at high elevations.
(B) The landscape is in a youthful stage of

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(D) A is false but R is true.

174. A high Drainage Frequency value, similar to high Drainage Density, suggests:
(A) A landscape with efficient surface runoff and fine drainage texture.
(B) Highly permeable soils.
(C) A very large and circular drainage basin.
(D) A mature landscape with low relief.

175. The shape of a drainage basin is quantitatively expressed by:
1. Bifurcation Ratio and Stream Order.
2. Drainage Density and Drainage Frequency.
3. Hypsographic Curve and Clinographic Curve.
4. Basin Circularity Ratio and Form Factor.
(A) 1 only
(B) 2 only
(C) 3 only
(D) 4 only

176. Match List I with List II concerning geographical curves:
List I: (Curve Type)
P. Hypsographic Curve
Q. Clinographic Curve
R. Altimetric Frequency Graph
S. Longitudinal Profile
List II: (Represents)
1. Relation of slope to area
2. Frequency distribution of elevation
3. Elevation along a river's course
4. Relation of elevation to area
Which of the following codes is correct?
(A) P-1, Q-4, R-2, S-3
(B) P-4, Q-1, R-3, S-2
(C) P-4, Q-1, R-2, S-3
(D) P-3, Q-2, R-1, S-4

177. A researcher analyzing population data for India finds a dataset containing state names and their corresponding total population for the year 2011. This dataset is an example of:
(A) Spatial data
(B) Raster data
(C) Non-spatial data
(D) A Digital Elevation Model

178. The creation of a map showing land use categories (forest, urban, water, agriculture) using different colors is an application of:
(A) Thematic cartography
(B) Georeferencing
(C) Photogrammetry
(D) Slope analysis

179. A pilot captures an image of the ground where the camera axis is tilted 15 degrees from vertical. This produces a(n):
(A) Vertical aerial photograph
(B) Oblique aerial photograph
(C) Orthophotograph
(D) DEM

180. The process of enhancing an image to highlight certain features, or applying a filter to remove noise, is part of:
(A) Georeferencing
(B) GPS positioning
(C) Digital Image Processing
(D) Stream ordering

181. Consider the following statements regarding geographical techniques:
1. A DEM is a vector representation of terrain.
2. Georeferencing assigns real-world coordinates to a map.
3. Photogrammetry involves making measurements from photographs.
4. An Isarithmic map connects points of equal value.
Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 3 and 4
(D) 1, 2 and 4

182. To test if there is a statistically significant difference between the mean height of male and female students in a class, the most appropriate test would be:
(A) ANOVA
(B) t-test
(C) Chi-square test
(D) Cluster analysis

183. The primary output of a Principal Component Analysis (PCA) is:
(A) A set of principal components, which

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(C) Can we predict house price from its size?
(D) What is the trend of GDP over the last 20 years?

205. Match List I (Analysis Type) with List II (Objective):
List I: (Analysis Type)
P. Correlation Analysis
Q. Time Series Analysis
R. Cluster Analysis
S. Principal Component Analysis
List II: (Objective)
1. Identify natural groupings in data
2. Reduce data dimensionality
3. Measure strength of linear relationship
4. Analyze data sequenced over time
Which of the following codes is correct?
(A) P-3, Q-4, R-1, S-2
(B) P-4, Q-3, R-1, S-2
(C) P-3, Q-4, R-2, S-1
(D) P-2, Q-1, R-4, S-3

206. In morphometric analysis, what does "ordering of streams" refer to?
(A) The process of ranking streams based on their length.
(B) The hierarchical classification of stream segments within a drainage network.
(C) The measurement of the angle between stream junctions.
(D) The calculation of the total stream length in a basin.

207. A basin with a Circularity Ratio close to 1 is likely to have:
(A) A faster hydrograph response to a storm event compared to an elongated basin of the same area.
(B) A slower hydrograph response to a storm event compared to an elongated basin.
(C) A very high bifurcation ratio.
(D) A very low drainage density.

208. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : A hypsographic curve provides insights into the erosional stage of a landscape.
Reason (R) : The shape of the curve, particularly its convexity or concavity, reflects the distribution of mass at different elevations, which changes as erosion progresses.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

209. To represent the number of tourists visiting three different national parks in a year, which would be the most appropriate diagram?
(A) Line Graph
(B) Pie Diagram
(C) Flow Map
(D) Bar Diagram

210. The concept of a 'Datum' is fundamental to which GIS process?
(A) Thematic mapping
(B) Database query
(C) Georeferencing
(D) Overlay analysis

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211. Which type of resolution is most important for distinguishing between two different but spectrally similar types of vegetation?
(A) High spatial resolution
(B) High temporal resolution
(C) High radiometric resolution
(D) High spectral resolution

212. Photogrammetry is most closely associated with the interpretation and measurement from:
(A) Aerial photographs and satellite images
(B) GPS signals
(C) Statistical tables
(D) Census records

213. The main application of Big Data sharing in natural resource management is to:
(A) Replace field surveys entirely.
(B) Allow for more comprehensive and integrated analysis using diverse remote sensing datasets.
(C) Focus solely on GPS tracking of wildlife.
(D) Create aesthetically pleasing maps without analytical depth.

214. Which sampling procedure involves selecting individuals at regular intervals from a list?

(B) Soil type and land use data only.
(C) GPS coordinates of a single point.
(D) A Digital Elevation Model (DEM) or a detailed topographic map.

195. Consider the following statements regarding drainage basins:
Statement I : A low Form Factor (<<1) indicates a highly elongated basin.
Statement II : An elongated basin is more likely to have a prolonged, lower flood peak than a circular basin of the same size.
Which of the statement(s) given above is/are correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct, but Statement II is incorrect.
(D) Statement I is incorrect, but Statement II is correct.

196. The difference between a clinographic curve and an altimetric frequency graph is that:
(A) The former plots elevation frequency, while the latter plots slope against area.
(B) The former plots slope against area, while the latter plots elevation frequency.
(C) The clinographic curve is cumulative, while the altimetric graph is not.
(D) There is no significant difference between them.

197. Which of the following is considered a source of spatial geographic information?
(A) A novel describing a landscape.
(B) A census table with demographic data by district name.
(C) An aerial photograph.
(D) A list of historical dates.

198. Consider the following map types:
1. Choropleth
2. Isarithmic
3. Dasymetric
4. Flow Map
5. Chorochromatic

Which of the mapping techniques given above are commonly used in cartography?
(A) 1, 2, and 4 only
(B) 1, 2, 3, 4, and 5
(C) 2, 3, and 5 only
(D) 1, 4, and 5 only

199. A raster data format is to a grid of cells as a vector data format is to:
(A) A Digital Elevation Model
(B) Attribute data tables
(C) A satellite sensor
(D) Points, lines, and polygons

200. The primary goal of a Spatial Decision Support System (SDSS) is to:
(A) Aid decision-makers by providing tools to explore spatial problems.
(B) Create visually appealing maps.
(C) Collect real-time location data.
(D) Store large databases of non-spatial information.

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201. The ability of a sensor to detect fine differences in electromagnetic energy is its:
(A) Spatial resolution
(B) Radiometric resolution
(C) Temporal resolution
(D) Spectral resolution

202. Which of the following represents the correct sequence of the three main segments a GPS signal travels through to provide a position?
1. Space
2. Ground
3. Receiver

(A) $2 \rightarrow 3 \rightarrow 1$
(B) $1 \rightarrow 3 \rightarrow 2$
(C) $1 \rightarrow 2 \rightarrow 3$
(D) $2 \rightarrow 1 \rightarrow 3$

203. Which measure of dispersion is most sensitive to extreme outliers?
(A) Interquartile Range
(B) Standard Deviation
(C) Variance
(D) Range

204. ANOVA is an appropriate statistical test to answer which of the following questions?
(A) Is there a difference in the mean rainfall across four different climatic zones?
(B) Is there a relationship between gender and voting preference?

(C) Elevation
(D) Stream density

249. Which of the following correctly pairs a graphical method with its purpose in morphometry?
(A) Clinographic Curve - Shows distribution of stream orders.
(B) Altimetric Frequency Graph - Shows a cross-section of a valley.
(C) Profile - Shows the relationship between slope and area.
(D) Hypsographic Curve - Shows the relationship between elevation and cumulative area.

250. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : Normalization is an essential step before creating a composite index from indicators with different units (e.g., income in dollars, life expectancy in years).
Reason (R) : Normalization brings all indicators to a common scale, preventing indicators with larger absolute values from unduly influencing the final index score.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Direction : Please read the following source carefully.

The creation of maps to represent geographical phenomena involves a variety of specialized techniques, each suited for different types of data and analytical purposes. Choropleth maps are widely used to display quantitative data for predefined administrative or statistical units, such as countries or districts, using a range of colours or shades to represent variations in density, percentage, or average value. In contrast, Isarithmic maps, including contour maps, are employed to visualize continuous phenomena that vary smoothly across a surface, like temperature or elevation, by connecting points of equal value with lines. A more sophisticated technique, the Dasymetric map, refines the choropleth method by using ancillary information to more accurately delineate areas of homogeneous value, transcending the often-arbitrary boundaries of administrative units. For representing qualitative or categorical data, such as land use types or soil classifications, Chorochromatic maps are utilized, assigning a distinct colour to each category. Finally, to illustrate the movement or flow of goods, people, or information between locations, Flow Maps are employed. These maps use lines or arrows of varying thickness to indicate the magnitude or volume of movement, effectively visualizing spatial interactions and connectivity across a geographic area.

Based on the above source, attempt the following five questions.

251. Which cartographic technique is most appropriate for visualizing the volume of trade between different countries in a continent?
(A) Isarithmic map
(B) Flow Map
(C) Choropleth map
(D) Dasymetric map

252. A geographer wishes to create a map showing average annual rainfall, a phenomenon that varies continuously across a region. Which of the following map types would be the most suitable choice?
(A) Isarithmic map
(B) Chorochromatic map
(C) Choropleth map
(D) Flow Map

253. What is the primary characteristic that distinguishes a Dasymetric map from a Choropleth map?
(A) It uses lines to connect points of equal value.
(B) It represents qualitative data instead of quantitative data.
(C) It uses ancillary information to refine boundaries beyond administrative units.
(D) It employs arrows of varying thickness to show movement.

254. A map depicting different soil types across a state by assigning a unique colour to each type (e.g., red for laterite, black for regur) is an example of which technique?
(A) Choropleth mapping
(B) Dasymetric mapping

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(A) Simple Random Sampling
(B) Stratified Sampling
(C) Systematic Sampling
(D) Cluster Sampling

215. A p-value of 0.03 in a statistical test would typically lead to which conclusion, assuming a significance level of 0.05?
(A) Conclude that the test is invalid.
(B) Fail to reject the null hypothesis.
(C) Accept the alternative hypothesis as proven true.
(D) Reject the null hypothesis.

216. A researcher wants to build a model to predict the probability of a landslide occurring based on slope, soil type, and rainfall. Which would be a suitable advanced form of regression?
(A) Logistic Regression
(B) Simple Linear Regression
(C) Time Series Analysis
(D) Cluster Analysis

217. Which of the following techniques is used for data reduction?
(A) t-test
(B) Principal Component Analysis
(C) Chi-square test
(D) ANOVA

218. Consider the following pairs of morphometric parameters and their interpretations:
1. High Drainage Density - Impermeable surface
2. Low Bifurcation Ratio - Structurally complex terrain
3. High Form Factor (close to 1) - Elongated basin
4. High Circularity Ratio (close to 1) - Compact, circular basin

Which of the pairs given above are correctly matched?
(A) 1 and 2
(B) 2 and 3
(C) 3 and 4
(D) 1 and 4

219. A transverse profile in geomorphology is:
(A) A profile along the length of a river.
(B) Another name for a hypsographic curve.
(C) A graph showing slope distribution.
(D) A profile across a river valley.

220. The key information derived from a clinographic curve is:
(A) The percentage of the land area that has a certain degree of slope.
(B) The total area of the basin.
(C) The elevation at different points along a river.
(D) The number of streams in a basin.

221. Consider the following statements about geographic data:
1. Spatial data has a locational component.
2. Non-spatial data describes characteristics.
3. A map of population density is derived from both spatial (e.g., district boundaries) and non-spatial (e.g., population count) data.
4. Raster and vector are formats for non-spatial data.

Which of the statements given above are correct?
(A) 1 and 2 only
(B) 1, 2 and 3
(C) 3 and 4 only
(D) All of the above

222. Which of the following is NOT a direct application of GIS?
(A) Thematic cartography
(B) Spatial decision support system
(C) Determination of satellite orbital parameters
(D) Georeferencing of maps

223. What is the main advantage of an active sensor in remote sensing over a passive one?
(A) It has higher spatial resolution.
(B) It is less expensive to build and operate.
(C) It captures more spectral bands.
(D) It can operate regardless of solar illumination.

224. Which GPS segment is responsible for correcting clock errors and transmitting ephemeris data?
(A) Ground Control Segment
(B) Space Segment
(C) Receiver Segment
(D) User Segment

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225. A student calculates the average income for a village. This 'average income' is a measure of:
(A) Dispersion

(B) Central Tendency
(C) Inequality
(D) Correlation

226. In Strahler's method of stream ordering, what is the order of the stream segment that results from the confluence of a 3rd order stream and a 4th order stream?
(A) 3rd order
(B) 4th order
(C) 5th order
(D) 7th order

227. A perfectly circular drainage basin would have a Form Factor of approximately:
(A) 0.785
(B) 0.00
(C) 0.50
(D) 1.00

228. Which of the following statements is INCORRECT?
(A) A clinographic curve relates slope to area.
(B) A hypsographic curve relates elevation to area.
(C) A profile is a two-dimensional representation of a statistical relationship.
(D) An altimetric frequency graph is a histogram of elevation.

229. Which of the following is an example of a GIS analysis function?
(A) Changing the color of a polygon feature.
(B) Digitizing a road from a scanned map.
(C) Importing a shapefile into a project.
(D) Performing an overlay of a soil map and a land use map.

230. A satellite that can distinguish between narrow bands of green, red, and blue light has a higher _____ than one that only sees in black and white.
(A) Spatial resolution
(B) Temporal resolution
(C) Spectral resolution
(D) Radiometric resolution

231. Identifying the incorrect pair from the following:
(A) GPS Space Segment - Constellation of satellites
(B) GPS Ground Segment - User's handheld device
(C) GPS Receiver Segment - Processes incoming signals
(D) GPS Application - Vehicle Navigation

232. To analyze trends in India's monsoon rainfall from 1950 to 2020, a geographer would most likely use:
(A) Time Series Analysis
(B) Cluster Analysis
(C) Chi-square Test
(D) Principal Component Analysis

233. The final output of a cluster analysis is:
(A) A predictive equation.
(B) A p-value.
(C) A set of uncorrelated principal components.
(D) A set of groups or clusters, where members of each group are similar to one another.

234. A basin characterized by impermeable surfaces and a high degree of dissection will likely have:
(A) High drainage density and high drainage frequency.
(B) Low drainage density and low drainage frequency.
(C) High drainage density and low drainage frequency.
(D) Low drainage density and high drainage frequency.

235. An Altimetric Frequency Graph is used to:
(A) Show the relationship between area and elevation.
(B) Show the frequency of occurrence of different elevation zones in a region.
(C) Show the change in slope across a region.
(D) Show the profile of a river.

236. Which map is designed to show continuous data, such as air pressure or temperature, using lines?
(A) Choropleth
(B) Isarithmic
(C) Dasymetric
(D) Chorochromatic

237. The science, art, and technology of obtaining reliable information from photographs is:
(A) Photogrammetry
(B) GIS

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(C) GPS
(D) Cartography

238. Consider the following statements:
1. GIS is a system for capturing, storing, analyzing, and managing spatial data.
2. A key function of GIS is thematic cartography.
3. A Spatial Decision Support System is a GIS application.
4. GIS operates exclusively with raster data.

Which of the statements given above are correct?
(A) 1 and 4 only
(B) 2 and 3 only
(C) 1, 2, and 3
(D) All are correct

239. The term "sampling" in statistics refers to:
(A) The entire set of individuals of interest.
(B) The calculation of the mean and variance.
(C) The process of selecting a representative subset from a population.
(D) The final conclusion of a hypothesis test.

240. The measurement of indices, making indicators scale-free, and computation of a composite index are all steps in:
(A) Performing a hypothesis test like ANOVA.
(B) Analyzing trends over time.
(C) Grouping observations into clusters.
(D) Creating a simplified, multi-faceted measure from various variables.

241. What does the Bifurcation Ratio typically reflect in a drainage basin?
(A) The degree of branching within the stream network.
(B) The shape of the basin.
(C) The total length of streams.
(D) The average slope of the basin.

242. A hypsographic curve with a large portion of the curve in the upper, gentle-slope section indicates:
(A) A youthful landscape.
(B) A landscape dominated by plateaus or extensive upland areas.
(C) A landscape in an old stage of erosion, with large areas at low elevation.
(D) A mountainous region with many high peaks.

243. The primary difference between spatial and non-spatial data is the presence of:
(A) Numerical values
(B) Geographic coordinates
(C) Textual information
(D) Temporal information

244. A map using different patterns (dots, lines, cross-hatching) within state boundaries to show different levels of literacy rate is a:
(A) Choropleth map
(B) Isarithmic map
(C) Chorochromatic map
(D) Dasymetric map

245. Which of the following is NOT a component of GIS?
(A) GIS Database (raster, vector)
(B) Functions of GIS (conversion, editing, analysis)
(C) GPS receiver manufacturing
(D) Georeferencing

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246. Consider the following statements about remote sensing:
1. A platform carries a sensor.
2. A sensor detects electromagnetic radiation.
3. Resolution can be spatial, spectral, temporal, or radiometric.
4. Photogrammetry is unrelated to remote sensing.
5. Digital Image Processing is used to enhance satellite imagery.

Which of the statements given above are correct?
(A) 1, 2, 3, and 4
(B) 2, 3, 4, and 5
(C) 1, 2, 3, and 5
(D) 1, 3, 4, and 5

247. To analyze if the average monthly sales of a product are the same for three different cities, a researcher should use:
(A) t-test
(B) ANOVA
(C) Chi-square test
(D) Correlation

248. The Form Factor (Ff) of a drainage basin relates the basin's area to its:
(A) Length
(B) Perimeter

are linear combinations of the original variables.
(B) A set of clusters.
(C) A regression equation.
(D) A p-value for hypothesis testing.

184. In morphometry, the total length of all stream channels within a basin divided by the area of that basin yields the:
(A) Drainage Frequency
(B) Form Factor
(C) Bifurcation Ratio
(D) Drainage Density

185. A graph showing the percentage of a basin's area that lies above a given elevation is a:
(A) Profile
(B) Hypsographic Curve
(C) Clinographic Curve
(D) Altimetric Frequency Graph

186. Which of the following is NOT a technique for data representation on maps?
(A) Pie diagrams
(B) Bar diagrams
(C) Hypsographic Curve
(D) Line Graph

187. In GIS, which data format would be most efficient for storing the exact boundary of a country?
(A) Raster
(B) DEM
(C) Attribute
(D) Vector

188. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A) : The temporal resolution of a satellite is a critical factor for monitoring dynamic phenomena like floods or crop growth.
Reason (R) : High temporal resolution means more frequent data acquisition, allowing for the observation of changes over short periods.
Which of the following is correct?
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

189. Which element of image interpretation relies on the location of an object with respect to other recognizable objects?
(A) Tone
(B) Texture
(C) Shape
(D) Association

190. What is the main application of GPS technology in geography?
(A) To determine the precise geographic location of features on the Earth's surface.
(B) To analyze the chemical composition of soil.
(C) To measure the reflectance of different land cover types.
(D) To process satellite images to remove atmospheric errors.

191. A dataset with a mean of 50, a median of 60, and a mode of 65 is:
(A) Normally distributed
(B) Negatively skewed
(C) Positively skewed
(D) Symmetrically distributed

192. A researcher wishes to investigate whether a person's choice of political party (Party A, Party B, Party C) is independent of their region of residence (North, South, East, West). The appropriate statistical test is:
(A) t-test
(B) ANOVA
(C) Chi-square test
(D) Regression

193. The purpose of a Composite Index is to:
(A) Provide a multi-dimensional measure of complex concepts like development.
(B) Test for statistical significance between two independent sample groups.
(C) Forecast the future values of a single, isolated statistical variable.
(D) Identify natural groupings or patterns within a provided large dataset.

194. Which of the following are key inputs for morphometric analysis of a drainage basin?
(A) Population census data and economic indicators.

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(C) Isarithmic mapping
(D) Chorochromatic mapping

255. Consider the following statements about map-making techniques:
Statement I: Choropleth maps are ideal for representing continuous data like air pressure.
Statement II: Dasymetric mapping is an enhancement of the choropleth technique.
Which of the following is correct?
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false, but Statement II is true.
(D) Statement I is true, but Statement II is false.

Direction : Please read the following source carefully.

Geographic Information Systems (GIS) are fundamentally built upon a database structure that accommodates both the spatial and non-spatial components of geographic information. The spatial data, which describes the location and shape of geographic features, is primarily stored in two formats: raster and vector. The vector data format represents the world using points, lines, and polygons, making it ideal for depicting discrete features with clear boundaries, such as roads, rivers, or administrative borders. In contrast, the raster data format uses a grid of cells, or pixels, where each cell is assigned a value representing a specific attribute, such as elevation or land cover. This format is particularly well-suited for representing continuous phenomena. Complementing the spatial data is the attribute data, a non-spatial component typically stored in tabular formats. This attribute data provides descriptive information about the spatial features. Key functions within a GIS facilitate the manipulation and analysis of this data, including conversion between raster and vector formats, editing to correct or update spatial and attribute data, and a wide array of analysis functions that enable spatial inquiry, pattern recognition, and modeling. Pie diagrams, bar diagrams, and line graphs are common methods for representing this data visually, both on and off maps.

Based on the above source, attempt the following five questions.

256. In a GIS, which data format would be most efficient for representing a national highway network with precise start and end points?
(A) Raster data format
(B) Vector data format
(C) Attribute data format
(D) Pie diagram format

257. A satellite image where each pixel corresponds to a land cover type (e.g., forest, water, urban) is a classic example of which data structure?
(A) Vector data
(B) Attribute data
(C) Line graph data
(D) Raster data

258. What is the primary role of attribute data within a GIS database?
(A) To provide descriptive, non-spatial information about geographic features.
(B) To store the coordinates and geometry of geographic features.
(C) To convert spatial data from raster to vector format.
(D) To represent continuous phenomena using a grid of cells.

259. The GIS function that involves modifying the shape of a polygon feature to reflect a more accurate boundary is an example of:
(A) Conversion
(B) Analysis
(C) Editing
(D) Representation

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260. Which of the following correctly pairs a data type with its most suitable representation format?
(A) Administrative boundaries of districts - Vector format
(B) A network of rivers - Raster format
(C) A temperature surface - Vector format
(D) A continuous elevation model - Line graph format

Direction : Please read the following source carefully.

Georeferencing is a foundational process in GIS, essential for integrating disparate spatial datasets into a common analytical framework. It involves assigning real-world coordinates to a digital map or image, thereby anchoring it to a specific

location on the Earth's surface. This process relies on a defined coordinate system, which provides a framework for defining locations, and a map projection, which is a systematic transformation of the latitudes and longitudes of locations from the surface of a sphere or an ellipsoid into locations on a plane. The choice of projection is critical as it inevitably introduces distortions in shape, area, distance, or direction. Complementing these is the datum, a model of the Earth that serves as a reference frame for calculating coordinates. A Digital Elevation Model (DEM) is a specific type of georeferenced dataset, typically in a raster format, where each cell value represents surface elevation. GIS applications leverage these georeferenced datasets for various purposes. Thematic cartography uses them to create maps focusing on specific themes, while spatial decision support systems (SDSS) integrate them with analytical models to help users make informed decisions regarding complex spatial problems, such as site selection or resource management.

Based on the above source, attempt the following five questions.

261. What is the fundamental purpose of georeferencing in GIS?
(A) To create a Digital Elevation Model.
(B) To convert data from vector to raster format.
(C) To build a spatial decision support system.
(D) To assign real-world coordinates to spatial data.

262. A map projection is described as a systematic transformation used to:
(A) model the Earth's shape to serve as a reference frame for coordinates.
(B) represent the three-dimensional Earth's surface on a two-dimensional plane.
(C) store elevation values in a raster grid format.
(D) create thematic maps for spatial decision support.

263. A Digital Elevation Model (DEM) is best described as:
(A) a coordinate system used for anchoring maps.
(B) a vector dataset representing administrative boundaries.
(C) a raster dataset where cell values correspond to surface elevation.
(D) a model used in a spatial decision support system for site selection.

264. The integration of georeferenced data with analytical models to assist in solving complex spatial problems like optimal facility location is a key function of a:
(A) Coordinate System
(B) Digital Elevation Model (DEM)
(C) Map Projection
(D) Spatial Decision Support System (SDSS)

265. Which of the following components serves as a reference frame for calculating geographic coordinates and is a model of the Earth?
(A) A Datum
(B) A Map Projection
(C) A Coordinate System
(D) A Thematic Map

Direction : Please read the following source carefully.

Remote sensing is the science of acquiring information about the Earth's surface without being in physical contact with it, primarily by sensing and recording reflected or emitted energy. The foundation of this technology lies in the electromagnetic spectrum (EMR), which encompasses the entire range of electromagnetic radiation, from short-wavelength gamma rays to long-wavelength radio waves. Different Earth-surface features interact with EMR in unique ways, reflecting, absorbing, or emitting energy at different wavelengths, creating distinct 'spectral signatures'. Remote sensing systems are designed to capture this energy using sensors, which are devices that detect and measure the EMR. These sensors are mounted on platforms, which are the vehicles that carry them, such as satellites or aircraft. The quality and utility of the data captured by a sensor are defined by its resolution. There are four key types of resolution: spatial resolution refers to the size of the smallest discernible object; spectral resolution denotes the number and width of the wavelength bands the sensor can detect; temporal resolution is the frequency with which the sensor can acquire data for the same area; and radiometric resolution describes the sensor's sensitivity to differences in signal intensity or brightness levels.

Based on the above source, attempt the following

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five questions.

266. According to the source, what is the primary role of a platform in remote sensing?
(A) To interpret the electromagnetic spectrum.
(B) To carry the sensor that captures energy.
(C) To define the spatial resolution of an image.
(D) To absorb and emit electromagnetic radiation.

267. A sensor's ability to distinguish between very fine variations in a specific wavelength band of the electromagnetic spectrum is a measure of its:
(A) Spatial resolution
(B) Spectral resolution
(C) Temporal resolution
(D) Radiometric resolution

268. If a satellite is capable of imaging the same location on Earth every 16 days, this 16-day interval refers to its:
(A) Temporal resolution
(B) Spectral resolution
(C) Radiometric resolution
(D) Spatial resolution

269. The unique pattern of reflection and absorption of electromagnetic energy by a specific surface feature, like a water body or a forest, is known as its:
(A) Spatial resolution
(B) Radiometric resolution
(C) Spectral signature
(D) Temporal signature

270. Which type of resolution would be most critical for identifying small individual buildings in a dense urban area from a satellite image?
(A) High spectral resolution
(B) High temporal resolution
(C) High radiometric resolution
(D) High spatial resolution

Direction : Please read the following source carefully.

The interpretation of remotely sensed imagery, including both aerial photographs and satellite images, is a critical skill in geography. This process relies on systematically examining several key elements visible in an image to identify features and patterns on the ground. These elements include tone or colour, texture, pattern, shape, size, shadow, and association. Tone refers to the relative brightness or colour of objects, which often correlates with the material's EMR reflectance. Texture is the perceived smoothness or roughness of a surface, created by the frequency of tonal change. Pattern describes the spatial arrangement of discernible objects, which can be natural or man-made. Shape and size provide geometric clues, while shadow can reveal an object's profile and height. Association refers to the occurrence of certain features in relation to others. This interpretive process is complemented by the field of photogrammetry, the science of making precise measurements from photographs. Photogrammetry is particularly crucial when working with different types of aerial photographs, such as vertical or oblique shots, to derive quantitative information like distance, area, and elevation, which is essential for accurate mapping and analysis. Recent developments in remote sensing technology, coupled with the ability to manage and share big data, have significantly enhanced its applications, especially in natural resources management in India.

Based on the above source, attempt the following five questions.

271. In satellite image interpretation, the regular, grid-like arrangement of streets in a planned city would be identified primarily through the element of:
(A) Tone
(B) Texture
(C) Pattern
(D) Shadow

272. A geographer determines the height of a tower in an aerial photograph by measuring the length of the dark area it casts. Which interpretive element is being used?
(A) Shape
(B) Shadow
(C) Association
(D) Texture

273. Photogrammetry is best defined as the science of:
(A) interpreting the qualitative elements of an image.
(B) identifying the spectral signature of objects.

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used for this purpose. Correlation analysis measures the strength and direction of the linear relationship between two continuous variables, yielding a coefficient that ranges from -1 (perfect negative correlation) to +1 (perfect positive correlation), with 0 indicating no linear relationship. It does not, however, imply causation. Regression analysis takes this a step further by attempting to model the relationship, allowing one to predict the value of a dependent variable based on the value of one or more independent variables. In many geographical studies, it is necessary to combine several different indicators, which may be measured on different scales, into a single score. To do this, one must first make the indicators scale-free, often through standardization or normalization, to prevent variables with larger ranges from dominating the result. Subsequently, these scale-free indicators can be aggregated to compute a Composite Index, such as a Human Development Index or a vulnerability index. This index provides a single, summary measure that simplifies complex, multi-dimensional phenomena for easier comparison and analysis across different geographical units.

Based on the above source, attempt the following five questions.

286. What is the fundamental difference between correlation and regression analysis?
(A) Correlation measures relationships for categorical data, while regression is for continuous data.
(B) Correlation requires scale-free indicators, while regression does not.
(C) Correlation implies causation, whereas regression only shows association.
(D) Correlation only measures the strength of a relationship, while regression models it for prediction.

287. A researcher finds a correlation coefficient of -0.85 between elevation and average annual temperature. What does this value indicate?
(A) A strong positive relationship where temperature increases with elevation.
(B) A weak negative relationship between temperature and elevation.
(C) A strong negative relationship where temperature tends to decrease as elevation increases.
(D) Almost no linear relationship between temperature and elevation.

288. Why is it necessary to make indicators scale-free before computing a composite index?
(A) To ensure a positive correlation between all variables.
(B) To prevent indicators with larger units or ranges from disproportionately influencing the final score.
(C) To convert all variables into a linear regression model.
(D) To ensure the resulting index has a value between -1 and +1.

289. The creation of a "drought vulnerability index" for different districts by combining indicators like rainfall deviation, groundwater levels, and crop failure rates is an example of:
(A) performing a simple correlation analysis.
(B) applying regression analysis for prediction.
(C) conducting a time series analysis.
(D) computing a composite index.

290. If a geographer develops a model that predicts crop yield (dependent variable) based on the amount of rainfall and fertilizer used (independent variables), which technique is being employed?
(A) Regression analysis
(B) Correlation analysis
(C) Computation of a composite index
(D) Principal Component Analysis

Direction : Please read the following source carefully.

In the face of large, multi-dimensional datasets, geographers often employ advanced statistical techniques to simplify complexity and uncover underlying structures. Principal Component Analysis (PCA) is a powerful data reduction method used for this purpose. It transforms a large set of correlated variables into a smaller, more manageable set of uncorrelated variables known as principal components. The first principal component accounts for the largest possible variance in the original data, the second component accounts for the second-largest variance, and so on. By retaining only the first few principal components, a researcher can reduce the dimensionality of the dataset while

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(A) Set A and Set B have the same mean and the same dispersion.
(B) Set A has a higher mean than Set B, but the same dispersion.
(C) Set B has a higher mean than Set A and a lower dispersion.
(D) Set A and Set B have the same mean, but Set B has a higher dispersion.

Direction : Please read the following source carefully.

Scientific inquiry in geography often relies on drawing conclusions about a larger population from a smaller, manageable subset, a process known as sampling. The validity of these conclusions hinges on the sampling procedure, which must be designed to ensure the sample is representative of the population. Once data is collected from the sample, researchers often engage in hypothesis testing to make inferences. A hypothesis is a testable statement about the relationship between variables or about the characteristics of a population. Statistical tests are employed to determine whether the observed data provides enough evidence to reject a null hypothesis (a statement of no effect or no difference). The choice of test depends on the nature of the data and the research question. For instance, the chi-square (χ^2) test is commonly used to compare observed frequencies with expected frequencies in categorical data, to test for independence or goodness-of-fit. The t-test is applied to compare the means of two groups to see if they are significantly different. For comparing the means of three or more groups, the Analysis of Variance (ANOVA) is the appropriate method. These tests allow geographers to move beyond mere description and make statistically-supported judgments about spatial patterns and relationships.

Based on the above source, attempt the following five questions.

281. A researcher wants to determine if there is a significant difference in the average income between residents of two different urban neighbourhoods. Which statistical test would be most suitable?
(A) t-test
(B) Chi-square test
(C) ANOVA
(D) Time Series Analysis

282. The primary purpose of employing a sampling procedure in geographical research is to:
(A) analyze the entire population exhaustively.
(B) draw statistically valid inferences about a population from a subset.
(C) prove the research hypothesis with absolute certainty.
(D) compare the means of three or more distinct groups.

283. A geographer is investigating whether the distribution of different tree species in a forest quadrant matches a theoretically expected distribution. The data consists of counts for each species. The most appropriate statistical test to use would be the:
(A) t-test
(B) Chi-square test
(C) ANOVA
(D) Regression Analysis

284. When would a researcher choose to use ANOVA instead of multiple t-tests?
(A) When comparing the means of three or more groups.
(B) When comparing the means of exactly two groups.
(C) When comparing the frequencies of categorical data.
(D) When analyzing the correlation between two continuous variables.

285. In hypothesis testing, what is the role of the null hypothesis?
(A) It is the researcher's primary assertion that they hope to prove.
(B) It is used to calculate the correlation between two variables.
(C) It is a statement of no effect or no difference that the test aims to challenge.
(D) It is a procedure for selecting a representative sample from a population.

Direction : Please read the following source carefully.

Geographical research frequently seeks to understand the relationships between different spatial variables. Correlation and Regression Analysis are two powerful statistical techniques

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(C) managing big data from remote sensing platforms.
(D) making precise measurements from photographs.

274. The 'smooth' appearance of a calm water body versus the 'coarse' appearance of a forest canopy in a high-resolution image relates to which element of interpretation?
(A) Texture
(B) Size
(C) Association
(D) Shape

275. The identification of a school building based on its proximity to a playground and sports fields is an example of using the element of:
(A) Tone
(B) Size
(C) Association
(D) Shadow

Direction : Please read the following source carefully.

In geographical analysis, statistical methods are indispensable for summarizing and interpreting data distributions. Measures of Central Tendency—namely the mean, median, and mode—provide a single value that attempts to describe the center of a set of data. The mean is the arithmetic average, the median is the middle value in an ordered dataset, and the mode is the most frequently occurring value. While these measures indicate the typical value, they do not describe the spread or variability within the data. For this, Measures of Dispersion are used. These include the range (the difference between the highest and lowest values), variance, and standard deviation (which measures the average distance of data points from the mean). A low standard deviation indicates that data points tend to be close to the mean, whereas a high standard deviation suggests they are spread out over a wider range. Beyond simple distribution, geographers are also concerned with Measures of Inequalities, which quantify the uneven distribution of a resource or phenomenon, such as income or access to services, across a population or geographical area. Understanding central tendency, dispersion, and inequality collectively provides a much more comprehensive picture of spatial patterns and processes.

Based on the above source, attempt the following five questions.

276. Which measure of central tendency would be most appropriate to use for a dataset of property values that contains a few extremely high-value outliers, in order to avoid distortion?
(A) The median
(B) The mean
(C) The mode
(D) The range

277. A geographer calculates a statistic that represents the average distance of individual rainfall measurements from the overall average rainfall for a region. What has been calculated?
(A) The median
(B) The mode
(C) The range
(D) The standard deviation

278. If a dataset of student test scores has a very low standard deviation, what can be inferred about the students' performance?
(A) The scores are spread out over a very wide range.
(B) The majority of students scored very close to the average score.
(C) The most frequent score was significantly higher than the average.
(D) The difference between the highest and lowest score is large.

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279. A study quantifies the distribution of healthcare facilities across different districts, finding that a few districts have a high concentration while many have very few. The statistical measures used for this quantification would fall under the category of:
(A) Measures of Central Tendency
(B) Measures of Dispersion
(C) Measures of Inequalities
(D) Measures of Correlation

280. Consider the following two datasets for daily temperatures in a city:
Set A: {25, 26, 25, 27, 25}
Set B: {15, 20, 25, 30, 35}
Which statement is true regarding these datasets?

preserving most of its original information, making it easier to visualize and analyze. Another important technique is Cluster Analysis, which is a method of classification. Its goal is to group a set of objects (such as cities, census tracts, or soil samples) in such a way that objects in the same group, or cluster, are more similar to each other than to those in other clusters. This is useful for identifying regions with similar characteristics, delineating market areas, or classifying land use patterns based on a variety of attributes, thereby revealing inherent groupings within spatial data without prior knowledge of the group definitions.
Based on the above source, attempt the following five questions.

291. What is the primary objective of Principal Component Analysis (PCA)?
(A) To group similar geographical objects into distinct clusters.
(B) To test hypotheses about the means of different populations.
(C) To reduce the number of variables in a dataset while retaining maximum information.
(D) To predict the value of a dependent variable from independent variables.

292. A market researcher uses data on income, age, education, and spending habits for various neighbourhoods to identify distinct "lifestyle segments" within a city. Which statistical technique is most suitable for this task?
(A) Cluster Analysis
(B) Principal Component Analysis
(C) Correlation Analysis
(D) Time Series Analysis

293. In PCA, how are the principal components ordered?
(A) In the order of their correlation with the original variables.
(B) In alphabetical order of their assigned names.
(C) In the order of their geographical significance.
(D) In decreasing order of the amount of variance they explain.

294. Which of the following scenarios best illustrates an application of Cluster Analysis in geography?
(A) Predicting future population growth based on historical trends.
(B) Identifying distinct agricultural regions within a country based on soil type, crop type, and irrigation methods.
(C) Reducing a dataset of 20 climate variables to 3 summary components.
(D) Measuring the strength of the relationship between literacy rate and per capita income.

295. The main advantage of using PCA on a dataset with many highly correlated variables is that it:
(A) proves causal relationships between the variables.
(B) groups the observations into meaningful categories.
(C) creates a new set of uncorrelated components, removing redundancy.
(D) makes the indicators scale-free for index computation.

Direction : Please read the following source carefully.

Morphometric analysis involves the quantitative measurement and mathematical analysis of the Earth's surface and the shape of its landforms, particularly drainage basins. A fundamental step in this process is the ordering of streams, which classifies tributaries within a river network hierarchically. From this, key ratios can be calculated. The Bifurcation Ratio is the ratio of the number of streams of a given order to the number of streams of the next higher order, providing insight into the branching pattern of the network. Drainage Density is a crucial measure calculated as the total length of all streams in a basin divided by the total area of that basin; a high density suggests an impermeable surface and rapid runoff. Similarly, Drainage Frequency is the total number of stream segments per unit area. The overall shape of the basin is also analyzed using indices like the Basin Circularity Ratio, which compares the basin's shape to a perfect circle, and the Form Factor, which relates basin length to its area. Further analysis involves the creation of profiles, slope analysis, and specialized graphs. The Hypsographic Curve, for instance, is a graph that shows the proportion of a basin's area at or above various elevations, while the Clinographic Curve represents the relationship between slope and elevation, both offering a comprehensive view

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of the basin's topography.
Based on the above source, attempt the following five questions.

296. A geomorphologist calculates a value by dividing the total length of all rivers in a watershed by the total area of that watershed. What has been calculated?
(A) Bifurcation Ratio
(B) Form Factor
(C) Drainage Frequency
(D) Drainage Density

297. The Bifurcation Ratio in a drainage basin analysis provides information about the:
(A) branching pattern of the stream network.
(B) overall shape of the basin compared to a circle.
(C) average slope of the basin.
(D) proportion of area at different elevations.

298. A graph that plots the cumulative percentage of a basin's area against its elevation is known as a:
(A) Clinographic Curve
(B) Hypsographic Curve
(C) Altimetric Frequency Graph
(D) Longitudinal Profile

299. A high Drainage Density in a basin typically indicates:
(A) highly permeable surface materials and low runoff.
(B) impermeable surfaces and high surface runoff.
(C) a very elongated basin shape.
(D) a very circular basin shape.

300. Which two morphometric indices are specifically designed to quantify the overall shape of a drainage basin?
(A) Basin Circularity Ratio and Form Factor
(B) Drainage Density and Drainage Frequency
(C) Bifurcation Ratio and Stream Order
(D) Hypsographic Curve and Clinographic Curve

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ANSWERS

1. (B) Data identifying the specific location of a feature on the Earth's surface.
Spatial data identifies the exact location of geographic features on the Earth's surface using specific coordinate systems such as latitude and longitude. This information allows for the precise mapping and spatial analysis of diverse physical and human phenomena. By providing a geometric framework, it enables researchers to understand the relationships between different locations, making it a foundational component of geographic information systems and cartographic science.

2. (A) It describes specific feature characteristics but lacks locational coordinates.
Non-spatial data describes the attributes or characteristics of features without referencing their exact geographic coordinates. This information provides the necessary context and descriptive details that complement spatial geometry. For instance, data such as population counts, school names, or average rainfall are linked to specific entities but do not themselves contain coordinate data until joined with a spatial file in a geographic information system for analysis.

3. (C) Choropleth
The choropleth technique is a thematic mapping method used to represent statistical data across predefined administrative units or geographic areas. By applying varying shades or patterns of a single color, geographers can effectively visualize the distribution and density of specific variables, such as population or literacy. This approach helps in comparing different regions and identifying spatial trends while maintaining the boundaries of the districts.

4. (C) Statement I is correct, but Statement II is incorrect.
Isarithmic maps use isolines to connect points of equal value, making them ideal for representing continuous phenomena like temperature, elevation, or atmospheric pressure. However, this technique is not suitable for discrete data like land use types, which have distinct boundaries rather than gradual transitions. Therefore, while the definition of isarithmic mapping is accurate, its application to discrete categorical data is fundamentally a conceptual mismatch.

5. (C) Flow map
Flow maps are specialized cartographic tools designed to visualize the movement and direction of objects or phenomena between different geographic locations. By utilizing lines of varying thickness, these maps represent the volume or intensity of interactions, such as migration, trade, or traffic. The width of the line is proportional to the quantity being moved, providing an intuitive and immediate understanding of spatial connectivity and dynamics.

6. (B) Chorochromatic
Chorochromatic maps use distinct and contrasting colors to represent different qualitative categories or non-quantitative regions on a map. This technique is commonly applied to show political boundaries, such as countries or states, where the primary objective is to differentiate areas based on names or types rather than statistical values. It ensures that adjacent features are visually distinguishable, facilitating the easy identification of individual geographic entities.

7. (A) Both Statement I and Statement II are true.
Dasymetric mapping serves as a sophisticated refinement of the traditional choropleth technique by incorporating ancillary data to improve spatial accuracy. Instead of being strictly limited by arbitrary administrative boundaries, it identifies zones of homogeneity that more closely reflect the actual distribution of the phenomenon. This method produces a more realistic representation of data by excluding uninhabited areas or integrating land cover information for refinement.

8. (A) A grid of cells where each cell represents a specific characteristic.

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The raster data format organizes geographic information into a regular grid of cells or pixels, where each unit contains a specific value representing a characteristic. This structure is particularly effective for modeling continuous phenomena, such as elevation or temperature, across a surface. Each cell corresponds to a specific area on the ground, and the resolution of the data is determined by the individual cell size.

9. (A) Both A and R are true and R is the correct explanation of A.
Vector data models are highly efficient for representing discrete features because they use points, lines, and polygons to define boundaries with high geometric precision. This structure allows for the accurate depiction of roads, rivers, and political limits where clear edges are required. The use of coordinates to define these shapes ensures that spatial relationships and topologies are maintained, supporting detailed geographic analysis and cartographic display.

10. (A) An attribute data format
Attribute data consists of descriptive information about geographic features, such as names, population figures, or literacy rates, typically stored in tabular format. This non-spatial information is linked to specific spatial features through unique identifiers, allowing GIS software to associate data with locations. Such formats are essential for thematic mapping and spatial queries, as they provide the underlying statistical details required to analyze and visualize.

11. (D) Choropleth maps represent continuous phenomena such as terrain elevation.
Choropleth maps are specifically designed to represent discrete statistical data aggregated over predefined administrative units, rather than continuous phenomena like terrain elevation. Continuous variables are more accurately depicted using isarithmic lines or raster-based digital elevation models. While techniques like pie diagrams, line graphs, and bar diagrams effectively show proportions, trends, and comparisons respectively, choropleths are limited to visualizing variations between distinct, bounded geographic regions.

12. (C) 1, 2 and 3
In geographic information systems, data is primarily categorized into raster, vector, and attribute formats. Raster data utilizes a grid of pixels, while vector data employs points, lines, and polygons to represent discrete features. Attribute data provides necessary non-spatial descriptions for these features. However, satellite images are the classic example of raster data, not vector data, because they are composed of individual pixels capturing spectral information.

13. (C) conversion
Conversion functions in a geographic information system allow for the transformation of data from one format to another, such as changing raster images into vector files. This process is essential for integrating diverse datasets and performing specific types of spatial analysis that may require a particular data structure. By converting formats, users can leverage the strengths of both models, ensuring compatibility and flexibility.

14. (D) Editing
Editing functions involve the modification, update, or correction of spatial and attribute data within a geographic information system. This includes adjusting the geometry of features, such as moving the vertices of a polygon to correct a boundary error or updating descriptive information in a table. Maintaining data accuracy through regular editing is crucial for ensuring that the GIS remains a reliable source.

15. (A) To represent the surface topography or terrain.
A Digital Elevation Model is a specialized raster dataset designed to represent the continuous surface topography or terrain of the Earth. Each cell in the grid contains an elevation value, allowing for the visualization of landforms and the calculation of slope and aspect. These models are fundamental for hydrological modeling, terrain analysis, and various engineering applications where accurate altitude information is essential for planning.

16. (B) Changing the symbology of a map layer
Analysis functions in GIS involve operations that generate new information or derive relationships, such as buffering, overlaying layers, or calculating network paths. Changing symbology, however, is a cartographic or visualization task focused

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on how data is displayed rather than altering the underlying data or performing a spatial calculation. While important for communication, symbology adjustment does not fall under the category of analytical processing functions.

17. (B) Georeferencing
Georeferencing is the critical process of assigning real-world geographic coordinates to a scanned map or raw satellite image. By establishing a relationship between the pixels of the image and known ground locations, the data can be accurately aligned with other spatial layers. This ensures that the information is correctly positioned on the Earth's surface, allowing for valid distance measurements and subsequent spatial analysis.

18. (A) A mathematical model of Earth used as a coordinate reference frame.
A datum serves as a fundamental mathematical model of the Earth's shape, providing the necessary reference frame for defining geographic coordinates. It establishes the origin and orientation of latitude and longitude lines, ensuring that positions are consistent and accurate across different maps. Choosing the correct datum is essential for georeferencing and spatial analysis, as different models can result in significant positional shifts on the surface.

19. (A) P-3, Q-1, R-4, S-2
Map projections are categorized based on the specific geometric properties they preserve during the transformation of the curved Earth to a flat plane. Equal-area projections maintain the relative size of features, while conformal projections preserve the shapes of small areas. Equidistant projections maintain true distances from specific points, and azimuthal projections preserve accurate directions from a central point. Matching these properties is vital for cartography.

20. (D) Spatial Decision Support System
A Spatial Decision Support System integrates geographic data, analytical models, and a database management system to assist decision-makers in evaluating complex scenarios. These systems are particularly valuable for city planners who must weigh various development options and their potential spatial impacts. By combining visualization with rigorous modeling, they provide a comprehensive framework for solving semi-structured spatial problems and making informed, data-driven policy choices.

21. (C) Thematic Cartography
Thematic cartography is a specialized branch of map-making focused on visualizing the spatial distribution of a specific subject or theme. Unlike general-reference maps that show diverse physical features, thematic maps highlight particular variables such as population density, climate patterns, or land cover. This approach allows users to identify patterns, relationships, and trends related to the chosen topic, making complex spatial information easier to interpret.

22. (A) Both A and R are true and R is the correct explanation of A.
Georeferencing is an indispensable preliminary step in spatial analysis because it anchors raw data to a known coordinate system. Without this alignment, different map layers cannot be overlaid accurately, and spatial relationships between features cannot be established. By assigning real-world coordinates, georeferencing ensures that all data exists within a consistent geometric framework, which is necessary for valid measurements, modeling, and subsequent geographic interpretation.

23. (D) Ultrasonic waves
Remote sensing primarily utilizes different regions of the electromagnetic spectrum, including visible light, infrared radiation, and microwaves, to collect information about the Earth's surface. These wavelengths interact with physical objects and are detected by specialized sensors. Ultrasonic waves, however, are mechanical sound waves rather than electromagnetic radiation. Therefore, they are not used in traditional satellite or aerial remote sensing systems for observing the Earth.

24. (A) Sensor
A sensor is a specialized device mounted on platforms like satellites or aircraft designed to detect and record electromagnetic radiation. These instruments capture energy reflected or emitted from the Earth's surface across various wavelengths, converting it into signals that can be processed into images. Sensors are the core technology in remote sensing, enabling

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the observation and measurement of physical features without direct physical contact.

25. (B) 1, 2, and 3 only
In remote sensing, sensors detect radiation while platforms carry these devices. The electromagnetic spectrum encompasses the full range of radiation frequencies utilized for observation. Importantly, remote sensing is defined by the absence of physical contact with the studied object. Furthermore, passive sensors do not provide their own energy; instead, they rely on naturally occurring sources like reflected solar radiation or emitted thermal energy.

26. (A) Spectral resolution
Spectral resolution refers to the ability of a remote sensing system to differentiate between specific wavelength intervals of the electromagnetic spectrum. It is determined by the number and width of spectral bands a sensor can record. Higher spectral resolution allows for the detection of more subtle differences in the reflectance of objects, which is critical for identifying specific land cover types, vegetation health.

27. (D) 16 days
Temporal resolution in remote sensing is defined as the frequency at which a sensor revisits and acquires data for the exact same geographic location. If a satellite completes its orbit and returns to image a specific area every sixteen days, its temporal resolution is exactly sixteen days. This parameter is crucial for monitoring dynamic environmental changes, such as vegetation growth cycles, urban expansion, or disaster recovery.

28. (B) Spatial resolution
Spatial resolution indicates the size of the smallest individual feature that a remote sensing instrument can detect on the ground. It is typically expressed as the area represented by a single pixel in an image. Higher spatial resolution means smaller pixels and greater detail, allowing for the identification of fine features like buildings or roads. This resolution is fundamental for determining the level of detail.

29. (C) Pattern
Pattern is a key element of image interpretation that refers to the spatial arrangement or repetition of objects within an image. Human-made features often exhibit regular, geometric patterns, such as the grid layout of city streets or the orderly rows in an orchard. Recognizing these arrangements helps analysts distinguish between different land uses and identify specific features that might not be easily classified by tone or shape alone.

30. (D) Tone
Tone refers to the relative brightness or color of objects in a remote sensing image, representing the intensity of energy reflected or emitted by the surface. It is the fundamental element of interpretation, as differences in tone allow for the discrimination of various features. For example, water bodies typically appear in dark tones due to high absorption, while reflective surfaces like concrete appear in lighter tones.

31. (A) Recording and interpreting photographic images or electromagnetic radiant imagery.
Photogrammetry is the scientific discipline dedicated to obtaining reliable measurements and information about physical objects through the recording and interpretation of photographic images. By analyzing the geometric properties of these images, researchers can determine the size, shape, and location of features on the Earth's surface. This science is essential for creating accurate topographic maps and digital elevation models from aerial or satellite imagery.

32. (A) 1, 2, 3, 4
Remote sensing systems are characterized by four primary types of resolution, each serving a distinct function. Radiometric resolution determines sensitivity to signal magnitude, while spatial resolution defines the smallest detectable object size. Spectral resolution is identified by the number of wavelength bands recorded, and temporal resolution refers to the revisit frequency over a specific area. Understanding these technical specifications is essential for selecting appropriate imagery.

33. (B) Oblique aerial photograph
An oblique aerial photograph is captured with the camera axis intentionally tilted at an angle relative to the vertical line. This perspective provides a side-view of the terrain, making features like buildings and topography appear more natural and recognizable. Unlike vertical

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photographs used for mapping, oblique images are excellent for providing a sense of depth and scale, which is useful for reconnaissance.

34. (A) To improve the quality of an image and extract useful information.
Digital Image Processing encompasses a range of techniques used to enhance the visual quality of remote sensing data and extract meaningful information. This involves correcting geometric and radiometric errors, enhancing contrast, and applying classification algorithms to identify land cover types. By processing raw digital signals, researchers can transform complex spectral data into interpretable maps and datasets that support environmental monitoring and spatial analysis.

35. (C) Natural Resources Management in India
The development of Big Data sharing platforms in remote sensing is particularly critical for natural resource management in India. These platforms facilitate the integration of vast amounts of multi-temporal and multi-sensor data, allowing for comprehensive monitoring of forests, water bodies, and agricultural land. By making high-volume data accessible, they support informed decision-making and sustainable development strategies across the country's diverse and vast geographical landscape.

36. (D) Bifurcation Ratio and Form Factor
Interpretation of aerial photographs and satellite imagery relies on visual elements such as tone, texture, shape, size, pattern, and association. These elements allow analysts to identify and classify ground features based on their appearance in the image. In contrast, the bifurcation ratio and form factor are quantitative morphometric parameters used to describe the geometric properties of drainage basins, rather than being visual elements used for image interpretation.

37. (A) Both Statement I and Statement II are correct.
Remote sensing sensors are classified based on their energy source. Active sensors, such as radar or lidar, generate their own electromagnetic radiation to illuminate the target and record the reflected energy. Passive sensors, like traditional cameras or multispectral scanners, rely on external energy sources, typically reflected solar radiation or thermal energy emitted by the Earth. Both types are essential for comprehensive environmental monitoring under various conditions.

38. (C) Space Segment
The space segment of the Global Positioning System consists of a constellation of satellites orbiting the Earth. these satellites continuously broadcast radio signals containing their precise location and time. This network ensures that at least four satellites are visible from almost any point on the Earth's surface at any given time, which is necessary for a receiver to calculate an accurate three-dimensional position.

39. (D) To track the satellites, monitor their transmissions, and upload data.
The primary function of the ground control segment in the Global Positioning System is to manage the health and accuracy of the satellite constellation. This involves tracking the satellites' orbits, monitoring their signals for errors, and uploading updated navigation data. By ensuring that the satellites provide precise information, the control segment maintains the overall integrity and reliability of the positioning services for users worldwide.

40. (A) Both A and R are true and R is the correct explanation of A.
Accurate three-dimensional positioning through GPS requires signals from at least four satellites to solve for latitude, longitude, and altitude. The fourth satellite is specifically needed to synchronize the receiver's inexpensive internal clock with the highly precise atomic clocks on the satellites. By accounting for this time offset, the system can correctly calculate the distance to each satellite, ensuring high-precision spatial coordinates.

41. (B) Any device, such as a smartphone or handheld unit, that records and processes signals from the satellites.
The receiver segment of the Global Positioning System encompasses all user equipment designed to detect and process satellite signals. This includes common devices like smartphones, handheld navigation units, and specialized surveying equipment. These receivers calculate the time it takes for signals to arrive from multiple satellites, using this data to determine the user's

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format. This normalization step is crucial for creating composite indices, as it ensures that indicators with large absolute values do not disproportionately influence the final result. By bringing all data to a uniform scale, researchers can fairly aggregate diverse information, such as income and life expectancy.

60. (D) Reducing dataset dimensionality while retaining the majority of the variance.
Principal Component Analysis is a multivariate statistical technique used to reduce the dimensionality of large datasets while preserving as much variance as possible. It transforms a set of correlated variables into a smaller number of uncorrelated variables called principal components. This process simplifies data analysis and visualization, helping researchers identify the most important factors and patterns within complex geographic or environmental information.

61. (A) 1, 2, and 3 only
Hypothesis testing involves statistical procedures designed to evaluate specific claims about populations using sample data. The Chi-square test, t-test, and ANOVA are classic examples of these procedures, used for comparing frequencies or means. While correlation analysis and cluster analysis are powerful exploratory tools for identifying relationships and groupings, they are not typically classified as formal hypothesis testing methods in the same way as the first three.

62. (B) Cluster Analysis
Cluster analysis is a multivariate statistical technique used to group observations into distinct categories based on their similarities across multiple variables. In market research, it allows for the segmentation of customers into groups with similar purchasing behaviors. By identifying these natural clusters, analysts can better understand population patterns and tailor strategies to specific segments, making it a valuable tool for classification in various disciplines.

63. (C) Strahler's method
Strahler's method of stream ordering is a widely used hierarchical classification system for river networks. It assigns the number one to all fingertip tributaries that have no tributaries of their own. The order increases only when two streams of the exact same order join; for example, two first-order streams form a second-order stream. If streams of different orders join, the higher order is maintained.

64. (D) The ratio of the number of stream segments of a given order to the number of segments of the next higher order.
The bifurcation ratio is a fundamental morphometric parameter that describes the degree of branching within a drainage network. It is calculated as the ratio between the number of stream segments of a specific order and the number of segments in the next higher order. This ratio provides insights into the basin's geological structure and hydrological response, typically ranging between three and five for most basins.

65. (A) The total length of all streams in a basin divided by the area of that basin.
Drainage density is a key morphometric measure calculated by dividing the total length of all stream channels within a basin by the total area of that basin. It reflects the efficiency of the drainage system and is influenced by factors such as climate, vegetation, and lithology. This parameter indicates how closely channels are spaced, providing important information about surface runoff and soil permeability.

66. (B) Sparse vegetation and impermeable surface material.
A high drainage density value indicates a finely dissected landscape with many stream channels per unit area. This condition is typically found in regions with sparse vegetation and impermeable surface materials, which promote high surface runoff and erosion. Because water cannot easily penetrate the ground, it forms numerous channels to flow over the surface, resulting in a dense network characteristic of rugged or poorly drained.

67. (A) 1, 2, 3, 4
A typical spatial analysis workflow in a geographic information system follows a logical progression of steps. It begins with data acquisition to gather necessary information, followed by georeferencing to align data with real-world coordinates. Once correctly positioned, analysis and modeling are performed to derive new

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segment monitors and maintains the system from Earth. The receiver segment includes the devices used by individuals to obtain position data. Together, these three segments ensure the global availability of precise positioning information.

51. (C) Analyzing the relationship between two categorical variables.
The Chi-square test is a non-parametric statistical procedure most appropriately used for analyzing the relationship between two categorical variables. By comparing the observed frequencies in a contingency table with the frequencies that would be expected if no relationship existed, it determines if the variables are independent. This test is essential in geography for assessing land use associations, demographic patterns, and other qualitative spatial distributions.

52. (D) ANOVA (Analysis of Variance)
Analysis of Variance, or ANOVA, is the most suitable statistical test for comparing the means of three or more independent groups. In this scenario, it would be used to determine if there are significant differences in average crop yields among the three types of fertilizers. By analyzing the variation within and between the groups, ANOVA assesses whether the observed differences are statistically significant.

53. (B) The difference in means between two groups.
A t-test is a fundamental statistical procedure used to evaluate whether there is a significant difference between the means of two groups. It is commonly applied to compare a sample mean to a known population mean or to compare the averages of two independent samples. By accounting for the variability in the data, the t-test helps researchers determine if observed differences are likely meaningful.

54. (C) Time Series Analysis
Time series analysis involves the systematic study of a sequence of data points collected or recorded at successive time intervals. This technique is used to identify trends, seasonal patterns, and cyclical variations over time. In geography, it is essential for monitoring changes in climate, population growth, or land use, providing the analytical framework necessary for forecasting future conditions based on historical patterns.

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55. (D) A strong negative linear relationship.
A correlation coefficient of -0.9 indicates a strong negative linear relationship between two variables. This means that as the value of one variable increases, the value of the other variable tends to decrease consistently. The value of 0.9 reflects a high degree of correlation, being very close to the perfect negative correlation of -1.0, suggesting that the data points closely follow a downward line.

56. (A) Predict the value of a dependent variable based on an independent variable.
In simple linear regression, the resulting equation provides a mathematical model to predict the value of a dependent variable based on the known value of an independent variable. By establishing the linear relationship between the two, researchers can estimate outcomes and understand how changes in one factor influence the other. This predictive capability is vital for modeling environmental impacts, economic trends, and spatial dynamics.

57. (D) A is false but R is true.
A correlation coefficient of zero specifically indicates the absence of a linear relationship between two variables, but it does not mean there is no relationship at all. It is possible for variables to be strongly related in a non-linear or curvilinear fashion while still yielding a zero correlation coefficient. Therefore, while the value suggests no linear association, further investigation is often required to identify complex patterns.

58. (A) To combine multiple individual indicators into a single score for comparison.
The primary goal of creating a composite index is to synthesize several individual indicators into a single, comprehensive score. This allows for easier comparison between different geographic regions or time periods regarding complex concepts such as development or environmental quality. By aggregating diverse variables, a composite index provides a multi-dimensional perspective that a single indicator cannot offer, facilitating more effective policy assessment.

59. (C) Making indicators scale-free
Making indicators scale-free is the process of transforming variables measured in different units and scales into a common, dimensionless

A hypsographic curve is a graphical representation used to show the cumulative frequency of elevations within a specific geographic area or drainage basin. It plots elevation on the vertical axis against the total area or percentage of area at or above that elevation on the horizontal axis. This curve is essential for understanding the distribution of mass and the overall erosional stage of a landscape.

77. (A) Altimetric Frequency Graph
An altimetric frequency graph is a statistical tool that plots the frequency of occurrence for different elevation values within a specific region. Often presented as a histogram, it shows how much of the land area falls within various altitude classes. This method is valuable for identifying dominant landform levels, such as plateaus or plains, and provides a clear summary of the vertical distribution of the terrain.

78. (C) Hypsographic Curve
The hypsographic curve is the most appropriate tool for representing the proportion of the Earth's surface that exists at or above a specific elevation. By showing the relationship between altitude and cumulative area, it provides a comprehensive overview of the vertical organization of a landscape. This curve is widely used by geographers and oceanographers to analyze the distribution of land and sea floor elevations.

79. (A) Both A and R are true and R is the correct explanation of A.
Dasymetric mapping offers a more realistic representation of data than standard choropleth maps because it is not constrained by arbitrary administrative boundaries. By utilizing ancillary information, such as land cover or population distribution patterns, it identifies more homogenous zones for data display. This approach refines the spatial resolution of the map, ensuring that statistical values are localized to areas where the phenomenon actually exists.

80. (C) The percentage breakdown of land use types within a single district.
A pie diagram is a highly effective cartographic tool for representing the proportional breakdown of a whole into its constituent parts for a specific location. It is ideally used on maps to show categories like land use types or demographic composition within individual administrative districts. This visualization allows for quick comparison of internal structures across different geographic areas while maintaining the spatial context of each unit.

81. (A) Raster
The raster data format is uniquely suited for representing continuous phenomena, such as elevation, temperature, or precipitation. By using a grid of cells where each cell contains a specific value, it can depict gradual changes across a surface without the need for discrete boundaries. This continuous data structure is fundamental for terrain analysis and environmental modeling, providing a realistic representation of variables that fluctuate smoothly across space.

82. (D) Editing
Editing is the broad term used in geographic information systems to describe the process of modifying, updating, or correcting both spatial and attribute data. This includes tasks such as refining feature boundaries, updating demographic information in tables, or correcting digitizing errors. Constant editing is necessary to maintain the accuracy and currency of a GIS database, ensuring it reflects the real-world conditions for effective spatial analysis.

83. (A) 1, 2, 3, and 4
Remote sensing systems are evaluated based on four primary types of resolution: spatial, temporal, spectral, and radiometric. Spatial resolution defines the smallest detectable object, while temporal refers to revisit frequency. Spectral resolution differentiates wavelength intervals, and radiometric resolution measures sensitivity to signal strength. While these resolutions often involve technical trade-offs, high spatial resolution does not always strictly mandate low temporal resolution, as satellite constellations continue to improve.

84. (D) Photogrammetry
Photogrammetry is the scientific discipline and technology used to obtain reliable measurements and 3D models from photographs, particularly aerial imagery. By applying geometric principles, it allows for the precise determination of distances, areas, and elevations on the Earth's surface. This science is foundational for creating

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insights or solve problems. Finally, the results are presented through data output and visualization, completing the decision-making cycle.

68. (A) The number of stream segments per unit area.
Drainage frequency is a morphometric parameter defined as the total number of individual stream segments per unit area of a drainage basin. It provides a measure of the texture of the drainage network, reflecting how many channels have formed within a given space. Along with drainage density, it helps geomorphologists understand the hydrological characteristics, surface runoff potential, and the degree of landscape dissection.

69. (D) The elongation of a drainage basin.
The basin circularity ratio is a dimensionless morphometric parameter used to quantify the overall shape of a drainage basin. It provides an index of elongation by comparing the basin area to the area of a circle with the same perimeter. This ratio helps geographers understand the basin's response to rainfall events, as the shape influences how quickly water reaches the outlet during a storm.

70. (A) Nearly circular.
The form factor is a quantitative measure of drainage basin shape, calculated as the ratio of the basin area to the square of its length. A value close to 1.0 indicates that the basin is nearly circular in shape. Circular basins typically experience rapid, high-peak discharges during storm events because all parts of the basin are roughly equidistant from the outlet, facilitating simultaneous runoff arrival.

71. (B) P-2, Q-1, R-3, S-4
Morphometric analysis uses various parameters to describe drainage basins. Drainage density is the ratio of total stream length to area, while the bifurcation ratio compares the number of streams between successive orders. The circularity ratio serves as an index of basin elongation and shape. Lastly, drainage frequency measures the total number of streams per unit area. Matching these parameters to their definitions is essential for geomorphological studies.

72. (B) Profile
A profile is a two-dimensional graphical representation that shows the cross-section of the Earth's surface along a specific line. By plotting elevation against horizontal distance, it allows for the visualization of landforms, such as hills, valleys, and slopes. Profiles are fundamental tools in geomorphology and engineering for understanding terrain variations, planning infrastructure, and analyzing the longitudinal or transverse characteristics of geographic features.

73. (B) To classify and quantify the steepness of the terrain.
Slope analysis in geomorphology is primarily focused on classifying and quantifying the gradient or steepness of the ground surface. By measuring the angle of inclination, researchers can understand landform development, assess soil erosion potential, and identify areas prone to landslides. This quantitative approach to terrain analysis is essential for environmental planning, agricultural management, and various engineering applications where topography influences physical processes.

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74. (A) The relationship between the slope of the ground and the percentage of area at that slope.
A clinographic curve is a specialized graphical method used in geomorphology to represent the relationship between the slope of the terrain and the percentage of the total area characterized by that slope. By plotting these variables, researchers can visualize the distribution of gradients within a region or drainage basin. This tool provides important insights into the erosional history and topographical complexity of a landscape.

75. (C) 1, 3 and 4
Morphometric analysis involves several key parameters. Drainage density reflects the texture and efficiency of the network, while the form factor indicates basin elongation. Stream ordering classifies the hierarchy of channels within the system. However, the bifurcation ratio is primarily a measure of the degree of branching rather than basin shape itself. Together, these quantitative tools allow geomorphologists to characterize the physical structure and hydrological behavior of basins.

76. (D) The cumulative frequency of elevations in an area.

the points are to a straight line, the stronger the negative relationship. This visualization is a fundamental tool for identifying trends between spatial variables.

110. (D) Basin Circularity Ratio
The basin circularity ratio is a dimensionless morphometric parameter that quantifies the shape of a drainage basin. It is calculated by dividing the basin's area by the area of a circle that has the same perimeter. A value closer to one indicates a more compact, circular shape, while lower values suggest elongation. This ratio is important for understanding hydrological responses, as circular basins generally produce more rapid flood peaks.

111. (B) Histogram of elevation data.
An altimetric frequency graph is essentially a histogram that displays the frequency of occurrence for various elevation values within a study area. It breaks down the terrain into altitude classes and shows the amount of land area falling into each. This visualization is useful for identifying dominant topographic levels, such as plains, plateaus, or mountain ranges, providing a statistical summary of the vertical distribution of the landscape.

112. (C) The clinographic curve relates slope to area, while the hypsographic curve relates elevation to area.
The fundamental difference between a clinographic curve and a hypsographic curve lies in the variables they relate to geographic area. A clinographic curve plots the distribution of slopes, showing the percentage of land characterized by specific gradients. In contrast, a hypsographic curve relates elevation to area, showing the cumulative frequency of altitude. Both tools are essential in geomorphology for analyzing topographical complexity and the erosional stage of a landscape.

113. (A) Both A and R are true and R is the correct explanation of A.
In Strahler's stream ordering system, a segment's order only increases when two streams of the same order intersect. For example, two second-order streams join to form a third-order stream. When a lower-order stream, such as a first-order, joins a higher-order stream like a second-order, the resulting segment retains the order of the higher one. This hierarchical logic ensures a consistent classification of the complexity of river networks.

114. (B) Conversion and Editing
Transforming scanned paper maps into digital GIS layers involves both conversion and editing functions. Georeferencing is a conversion process that translates pixels into real-world coordinates. Digitizing, which follows, is an editing task where points, lines, and polygons are traced to create vector features. These fundamental steps are necessary to modernize legacy data and ensure it can be used alongside other digital spatial datasets for analysis and mapping.

115. (C) The integration of some vast, multi-temporal, and multi-sensor data for comprehensive monitoring.
Big Data sharing platforms significantly benefit natural resource management by enabling the integration of diverse and massive datasets. These include information from various sensors and time periods, allowing for comprehensive monitoring of environmental changes. By providing access to high-volume remote sensing data, these platforms support better decision-making for forest management, water conservation, and biodiversity protection across large scales that were previously difficult to analyze using traditional methods.

116. (A) 1 and 2 only
Spatial data includes geographic coordinates, while non-spatial data refers to descriptive attributes like population. A road network file is typically represented using vector data (lines), not raster. Conversely, a satellite image is a classic example of raster data (pixels), not vector. Therefore, only the definitions of spatial and non-spatial data provided in the pairs are correctly matched to their typical geographic representations in a information system environment.

117. (D) Isarithmic
An isarithmic map is created by connecting points of equal value with continuous lines, known as isolines or isopleths. This technique is specifically used to represent continuous spatial phenomena that vary across a surface, such as

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topographic maps and digital elevation models, playing a crucial role in surveying, engineering, and various geographic information system applications.

85. (A) The vehicles, such as satellites or aircraft, that carry the sensors.
In the context of remote sensing, platforms are the vehicles or structures that carry specialized sensors to observe the Earth from a distance. These can include satellites, aircraft, drones, or even balloons. The choice of platform determines the altitude, coverage, and temporal frequency of the data collected. Platforms provide the stable base necessary for sensors to record electromagnetic radiation and generate imagery for spatial analysis.

86. (B) Gini Coefficient
The Gini coefficient is a widely used statistical measure of inequality in geographic and economic studies. It quantifies the degree of concentration or uneven distribution of a resource, such as income or population, across a given area. Values range from zero to one, where zero represents perfect equality and one indicates extreme inequality. This coefficient is essential for analyzing spatial disparities and assessing regional development.

87. (A) 2, 1, 3
Statistical tests are designed to compare means across different group sizes. The t-test is used for comparing two groups, while ANOVA is applied when evaluating three or more group means simultaneously. Post-hoc tests are then conducted following a significant ANOVA result to determine exactly which specific pairs of means differ. This logical sequence moves from simple two-group comparisons to complex multiple-group evaluations and detailed pair-wise analyses.

88. (D) 81% of the variance in the dependent variable is explained by the independent variable(s).
In regression analysis, the R-squared value, or coefficient of determination, represents the proportion of the variance in the dependent variable that is predictable from the independent variable. An R-squared of 0.81 signifies that eighty-one percent of the variability is explained by the model. This high value indicates a strong fit, suggesting that the chosen independent factors are highly effective at explaining the outcomes of the studied phenomenon.

89. (A) ANOVA - Comparing the means of three or more groups.
ANOVA is the correct statistical test for comparing the means of three or more independent groups to determine if at least one group differs significantly. In contrast, the t-test is for two groups, and the Chi-square test assesses associations between categorical variables. Correlation measures the strength of relationships rather than predicting values. ANOVA is essential for experimental designs where multiple treatments or categories are being evaluated.

90. (B) Median
Measures of dispersion, such as range, standard deviation, and variance, quantify the degree of spread or variability within a dataset. They describe how data points are distributed around a central value. The median, however, is a measure of central tendency that identifies the middle point of a distribution. While dispersion measures focus on the width of the data, central tendency measures focus on the typical value.

91. (C) Bar diagrams compare discrete categories, while line graphs show continuous change over time.
Bar diagrams and line graphs serve distinct analytical purposes in data representation. Bar diagrams are ideal for comparing discrete, independent categories, such as production levels across different countries. Line graphs are specifically designed to visualize continuous change or trends over a sequence of time intervals. This distinction ensures that the chosen visualization method correctly reflects the underlying nature of the data being analyzed and communicated.

92. (A) Both Statement I and Statement II are correct.
A coordinate system provides the mathematical framework necessary for georeferencing, allowing data to be accurately positioned on the Earth's surface. Map projections are the specific methods used to transform the curved, three-dimensional surface of the Earth onto a flat, two-dimensional plane. Both concepts are fundamental to cartography and GIS, ensuring

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precise geographic location, velocity, and time anywhere on the Earth.

42. (C) 1, 2 and 3
The Global Positioning System is composed of three fundamental segments: the space segment, the ground control segment, and the receiver segment. The space segment consists of orbiting satellites, while the control segment manages their operations. The receiver segment includes all user devices. Contrary to being restricted to military applications, GPS technology is now used globally for diverse civilian purposes, including navigation, timing, and environmental monitoring.

43. (D) Measuring the spectral signature of vegetation
GPS technology is primarily used for positioning, navigation, and tracking, such as geotagging photos, surveying, and vehicle guidance. It functions by calculating coordinates based on satellite signals. In contrast, measuring the spectral signature of vegetation involves analyzing how plants reflect different wavelengths of light, which is a core task of multispectral remote sensing rather than a direct function of the Global Positioning System.

44. (D) Mode
The mode is a fundamental measure of central tendency that identifies the most frequently occurring value within a dataset. Unlike the mean, which averages all values, or the median, which finds the middle point, the mode highlights the most common observation. This measure is particularly useful for categorical data or when identifying the most popular category in a distribution, providing insights into data clustering.

45. (A) Standard Deviation
Standard deviation is a key measure of dispersion that quantifies the amount of variation or spread of a set of values around the mean. It is mathematically calculated as the positive square root of the variance. A low standard deviation indicates that data points tend to be close to the mean, while a high value suggests that the data is spread out over a wider range.

46. (B) Mean
The arithmetic mean is the measure of central tendency most sensitive to extreme values or outliers in a dataset. Because it is calculated by summing all observations and dividing by the total count, a single very high or low value can significantly shift the result. In contrast, measures like the median or mode are more robust and less influenced by extreme data points at the tails.

47. (B) P-4, Q-1, R-2, S-3
Statistical analysis involves several core concepts: central tendency identifies the middle of a distribution, while dispersion measures the spread of data. Sampling is the process of selecting a subset from a larger population for study. Hypothesis testing provides a structured procedure to make inferences about population parameters based on sample evidence. Together, these tools allow researchers to summarize data, identify patterns, and draw valid conclusions.

48. (C) Simple random sampling
Simple random sampling is a fundamental probability sampling technique where every individual in a population has an equal and independent chance of being selected for a sample. This method minimizes bias and ensures that the subset is representative of the larger group. It is the gold standard for many statistical procedures, as it provides a solid foundation for making valid generalizations and testing hypotheses.

49. (D) To make an informed decision about a population using sample data.
Hypothesis testing is a structured statistical procedure used to make informed decisions or inferences about a population based on sample data. It involves formulating a null hypothesis and an alternative hypothesis, then using statistical evidence to determine if the null hypothesis should be rejected. This process allows researchers to assess the significance of their findings and draw generalized conclusions beyond the immediate dataset.

50. (A) 1, 2, and 3
The Global Positioning System is built upon three essential components: the space segment, the ground control segment, and the receiver segment. The space segment consists of the orbiting satellite constellation, while the control

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insights into the erosional stage and topographic characteristics, identifying dominant upland or lowland regions.

102. (B) 2 and 4 only
Flow maps use proportional line thickness to show movement, and choropleth maps represent aggregated statistical data within predefined administrative units. However, isarithmic maps are intended for continuous phenomena rather than discrete population density by district, and chorochromatic maps differentiate qualitative areas rather than using monochromatic shades. Therefore, only statements concerning flow maps and choropleths accurately describe their respective cartographic functions and typical data applications in thematic mapping.

103. (D) Descriptive, non-spatial information about a feature.
Attribute data in a geographic information system refers to the descriptive, non-spatial information that characterizes a feature. This data is typically stored in tables and linked to spatial geometry, such as points or polygons, through unique identifiers. Examples include a city's name, its population, or the type of soil in a region. Attribute data provides the essential "what" information that complements the "where" of spatial coordinates.

104. (B) Vector models represent the world using discrete objects, while raster models use grids.
The fundamental difference between vector and raster data models lies in how they represent geographic reality. Vector models use discrete geometric objects, specifically points, lines, and polygons, to define features with precise coordinates. Raster models represent the world as a continuous grid of uniform cells or pixels, each containing a value. While vectors are ideal for discrete features with clear boundaries, rasters are better suited for continuous environmental.

105. (A) A database management system and modeling capabilities within a GIS framework.
A Spatial Decision Support System is an integrated application that combines a robust database management system with sophisticated modeling and analytical capabilities. Operating within a geographic information system framework, it provides the tools necessary to analyze complex spatial problems and evaluate different decision scenarios. This integration allows for a comprehensive approach to problem-solving, moving beyond simple map-making to provide deep analytical insights for planners and researchers.

106. (B) The ability of a sensor to discriminate very slight differences in energy.
Radiometric resolution in remote sensing determines the sensitivity of a sensor to subtle variations in the intensity of electromagnetic radiation. It is measured by the number of gray levels or bits used to record the signal. Higher radiometric resolution allows for the detection of finer differences in the brightness of objects, which is critical for identifying features with similar spectral characteristics and improving the overall quality of interpretation.

107. (C) The overall process and plan for selecting a sample from a population.
A sampling procedure describes the systematic plan and specific methods used to select a representative subset of individuals from a larger population. This process is crucial in statistical research, as it ensures that the findings from the sample can be validly generalized to the whole group. Whether using random, stratified, or systematic methods, the chosen procedure must minimize bias and accurately reflect the population's underlying characteristics.

108. (B) 2, 1, 3, 4
The history of remote sensing has progressed from early aerial photography used during World War I to the launch of the first Landsat satellite in 1972. This was followed by the development of high-resolution commercial satellites like IKONOS at the turn of the century. Most recently, the field has evolved to include advanced Big Data platforms for large-scale Earth observation. This chronological sequence reflects significant technological milestones.

109. (A) A negative correlation.
A scatter plot where data points are arranged from the upper-left corner to the lower-right corner indicates a negative correlation between the two variables. This pattern shows that as the value of one variable increases, the value of the other variable consistently decreases. The closer

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that spatial data is both correctly located and appropriately represented for analysis and display.

93. (C) Raster
A Digital Elevation Model is a specific type of raster data format where the terrain is represented by a grid of cells. Each cell in the grid contains a single value representing the elevation of that specific area on the ground. This structure allows for the continuous modeling of surface topography, facilitating the calculation of slope, aspect, and hydrological flow paths, which are critical for many spatial analyses.

94. (D) The frequency of change and arrangement of tones in a particular area.
Texture is a key element in satellite image interpretation that describes the visual roughness or smoothness of a surface. It is defined by the frequency of tonal changes and the arrangement of those tones within a specific area. For example, a forest might exhibit a coarse texture due to the variation between shadows and canopy, while a smooth body of water shows uniform tone.

95. (A) Rejecting a true null hypothesis.
In statistical hypothesis testing, a Type I error occurs when a researcher incorrectly rejects a null hypothesis that is actually true. This is often referred to as a false positive, suggesting that an effect or difference exists when it does not. Controlling for the probability of a Type I error is a critical part of the research design, typically achieved by setting a conservative significance level.

96. (A) P-2, Q-1, R-3, S-4
Remote sensing involves specific components and technical specifications. The Thematic Mapper is an example of a sensor, while the Landsat satellite serves as the platform. Spatial resolution defines the smallest detectable area, such as thirty meters. Spectral resolution refers to the number of bands recorded by the sensor. Correctly matching these terms is essential for understanding how satellite imagery is acquired and the level of detail it provides.

97. (B) Temporal
Temporal resolution is the primary concern for an analyst studying changes over time, as it refers to the frequency of data acquisition for the same location. In this study, the two-year revisit period allows for the observation of long-term trends in urban green cover. High temporal resolution is essential for monitoring dynamic processes, providing a series of snapshots that reveal how the Earth's surface evolves across different periods.

98. (A) User Segment
The receiver segment of the Global Positioning System is commonly referred to as the user segment. This component includes all devices that receive and process signals from the satellite constellation to determine location, velocity, and time. Whether it is a smartphone, a car navigation system, or a high-precision surveying tool, these devices represent the final interface where GPS technology is applied for diverse personal and professional.

NODIA

99. (A) Both A and R are true and R is the correct explanation of A.
Principal Component Analysis is frequently used as a preliminary step for cluster analysis to simplify the data. By reducing the number of variables and eliminating multicollinearity, it ensures that the subsequent clustering process is more efficient and easier to interpret. PCA identifies the most significant patterns of variance, providing a cleaner set of inputs that helps cluster analysis group similar observations more accurately based on core characteristics.

100. (D) Highly elongated and narrow.
A form factor value of 0.25 is significantly lower than the value for a circular basin, indicating that the drainage area is highly elongated and narrow. In morphometry, this shape suggests a basin that is much longer than it is wide. This configuration typically results in a more attenuated hydrological response, with rainfall taking longer to travel from the distant parts of the basin to the outlet.

101. (C) Hypsographic Curve
The hypsographic curve is also known as the area-height curve because it represents the relationship between elevation and the area of land at or above that elevation. It provides a summary of the vertical distribution of the terrain within a drainage basin or geographic region. By showing how area varies with height, it offers

elevation (contours), temperature (isotherms), or rainfall (isohyets). These maps provide a clear visualization of gradients and trends, allowing for the easy identification of patterns in smooth, non-discrete geographical data.

118. (A) Flat maps can preserve shape, area, distance, and direction simultaneous properties.
It is mathematically impossible for a flat map to preserve shape, area, distance, and direction simultaneously when representing the curved Earth. All map projections inevitably introduce some form of distortion. Cartographers must choose which property to preserve based on the map's purpose. While conformal projections preserve shape and equal-area projections maintain size, no single projection can perfectly represent all geometric relationships on a two-dimensional surface without some compromise.

119. (B) P-3, Q-4, R-2, S-1
Geographic information and remote sensing terms serve distinct functions. A Digital Elevation Model represents terrain height, while the Global Positioning System identifies geographic location. A datum provides the necessary reference frame for coordinates, and Digital Image Processing is the technique used to enhance and analyze satellite imagery. Correctly identifying these primary functions is essential for understanding the technical components and workflows involved in modern spatial analysis and cartography.

120. (C) A sensor that provides its own source of energy to illuminate the target.
An active sensor is a remote sensing instrument that generates its own source of electromagnetic radiation to illuminate the Earth's surface. It then records the energy that is reflected back from the target. Common examples include radar and lidar systems. Because they do not rely on solar radiation, active sensors can operate at any time of day or night and can often penetrate clouds or dense vegetation.

121. (A) ANOVA, t-test
Interpretation of aerial photographs and satellite images relies on visual elements like shape, size, tone, texture, pattern, association, shadow, and site. These characteristics allow analysts to identify objects and understand geographic relationships. In contrast, ANOVA and t-tests are statistical procedures used for hypothesis testing and data analysis rather than visual image interpretation. While statistics may follow the interpretation process, they are not themselves elements used to identify features.

122. (D) Large-scale, long-term environmental monitoring and resource management.
Big Data sharing platforms facilitate the use of massive, multi-temporal remote sensing datasets, which are essential for large-scale and long-term environmental monitoring. These platforms allow researchers to track changes in ecosystems, climate patterns, and natural resources over vast areas and extended periods. By providing the infrastructure to process and share such high volumes of data, they support comprehensive management strategies and help in addressing global environmental challenges effectively.

123. (A) 1 only
The space segment of the Global Positioning System consists specifically of the satellite constellation that orbits the Earth and broadcasts navigation signals. Contrary to other statements, the receiver segment is the user's device, not the ground stations, and the control segment manages the satellites rather than being the user's device. These three segments must work together seamlessly to provide accurate positioning data; they are highly interdependent components.

124. (C) Central Tendency
Mean, median, and mode are the three primary measures of central tendency used in statistics to summarize a dataset. The mean provides the arithmetic average, the median identifies the middle value, and the mode represents the most frequent observation. Together, these measures offer insights into the typical or central value of a distribution, helping researchers understand the general pattern and behavior of the data being studied.

125. (D) Chi-square test
The Chi-square test is the most appropriate statistical procedure for studying the relationship between income level and mode of transport, as both are categorical variables. By evaluating the frequencies within different categories, the test determines if a significant association exists

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composite index provides a more comprehensive perspective than any single measure.

158. (B) Standard Deviation
Morphometric parameters, such as the bifurcation ratio, form factor, and drainage density, are specific quantitative measures used to describe the geometric and hydrological characteristics of a drainage basin. They provide insights into terrain structure and network efficiency. Standard deviation, however, is a general statistical measure of dispersion used to describe the spread of any numerical dataset. While useful in analyzing morphometric data, it is not itself a morphometric parameter.

159. (B) 1, 2, 3, and 4 only
Statistical analysis includes several key tools. The t-test and ANOVA are used to compare means across two or more groups, while the Chi-square test assesses categorical data associations. Correlation analysis measures the strength of linear relationships. However, Principal Component Analysis is an exploratory data reduction technique rather than a formal hypothesis testing method. Therefore, while the first four are primary hypothesis tests, PCA serves a different analytical purpose.

160. (A) A region with steep slopes and high structural disturbance, leading to a dense, well-developed drainage network.
A high bifurcation ratio, typically exceeding five, often indicates a drainage basin located in a region with steep slopes and significant structural disturbance. These conditions promote the development of a dense and complex network of streams. The high ratio reflects a high degree of branching as the river system adapts to rugged topography or varying geological formations, providing important clues about the structural and erosional history of the terrain.

161. (C) Angle of slope on the Y-axis and cumulative percentage of area on the X-axis.
A clinographic curve is constructed by plotting the angle of slope on the vertical axis against the cumulative percentage of the total area on the horizontal axis. This graphical method allows geomorphologists to visualize the distribution of gradients within a landscape or drainage basin. By showing how much of the terrain is characterized by specific degrees of steepness, it provides essential information about topographical complexity and surface runoff potential.

162. (D) A satellite image.
A satellite image is inherently spatial because it is composed of pixels that are directly associated with specific geographic locations on the Earth's surface. Unlike lists of populations or historical texts, which contain descriptive information about places, a satellite image provides the geometric and spectral context of the terrain itself. This spatial nature allows the data to be mapped, georeferenced, and integrated with other layers in a geographic system.

163. (B) Suggests that the mapped phenomenon is uniform within each areal unit.
The primary limitation of a choropleth map is the misleading suggestion that the mapped phenomenon is uniformly distributed across the entire area of each administrative unit. In reality, significant variations can exist within these districts. This approach can obscure localized patterns and give an inaccurate impression of data density, especially when units are large or diverse. This "ecological fallacy" is a critical consideration when interpreting aggregated statistical thematic maps.

164. (C) To assign ground coordinates to the pixels or features of a map or image.
The fundamental principle of georeferencing is to establish a mathematical relationship between the pixels of a digital image or the features of a map and real-world ground coordinates. By assigning these coordinates, the data is anchored to a specific location on the Earth's surface. This process is essential for ensuring that diverse datasets align correctly when overlaid, allowing for accurate distance measurements and valid spatial analysis.

165. (D) Integrate spatial data and analytical models to support complex decisions.
A Spatial Decision Support System is a specialized application designed to integrate diverse spatial data with sophisticated analytical models. Its primary purpose is to assist decision-makers in exploring and solving complex, semi-structured geographic problems. By providing tools for scenario testing and multi-criteria evaluation,

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geographic data. By establishing relationships between locations and attributes, it allows for sophisticated modeling, decision support, and problem-solving. Therefore, viewing it merely as a map-making tool overlooks its significant analytical capabilities.

134. (B) A table of annual rainfall measurements for a weather station.
Non-spatial data refers to descriptive attributes that lack geographic coordinates or geometry themselves. A table of rainfall measurements is a prime example; while it describes a phenomenon, it is not a spatial feature until it is linked to a coordinate or location. In contrast, coordinates, polygons, and lines represent the spatial component of a feature. Attribute tables provide the essential "what" that complements the "where" in GIS.

135. (A) Flow map
A flow map is the most appropriate cartographic tool for visualizing movement between different locations, such as migration from states to a city. By using arrows of varying widths proportional to the number of migrants, it provides a clear and immediate representation of volume and direction. This technique effectively highlights spatial interactions and connectivity, making complex movement data easier to interpret within a geographic context.

136. (C) It maps data distribution accurately by incorporating ancillary information.
The primary advantage of dasymetric mapping over traditional choropleth mapping is its ability to produce a more accurate representation of data distribution. By incorporating ancillary information, such as land cover or satellite imagery, it identifies where a phenomenon actually exists within administrative units. This approach refines the map's resolution and avoids the misleading assumption that data is uniformly distributed across large, potentially uninhabited or irrelevant areas.

137. (D) Sensor calibration
Core functions of a geographic information system include data conversion, editing, and spatial analysis. These processes allow users to transform, maintain, and derive insights from geographic data. Sensor calibration, however, is a technical procedure related to the maintenance and adjustment of remote sensing hardware, such as satellite or aerial sensors. While vital for data quality, calibration occurs at the hardware level and is not considered a standard software function.

138. (C) Datum
The World Geodetic System 1984 is a globally recognized datum that provides a fundamental mathematical model of the Earth's shape for coordinate reference. It serves as the standard reference frame for the Global Positioning System and most international mapping efforts. By establishing a consistent origin and orientation for latitude and longitude, WGS84 ensures that spatial data from different sources can be accurately integrated and precisely located.

139. (B) 1, 2, 4, 3
Creating a composite index follows a logical sequence starting with the selection of relevant indicators. These indicators must then be normalized, or made scale-free, to ensure they can be fairly compared. If necessary, weights are assigned to reflect the relative importance of each factor. Finally, the processed data is aggregated into a single numerical value. This structured approach ensures that the final index is balanced, comparable, and meaningful.

140. (D) Space, Ground Control, and Receiver Segments
The Global Positioning System is composed of three primary components: the space segment, the ground control segment, and the receiver segment. The space segment consists of the orbiting satellite constellation, while the control segment monitors and manages their operation from Earth. The receiver segment includes all user devices that process signals for location data. These three elements must function together seamlessly to provide accurate positioning information worldwide.

141. (B) The spread of data around the mean.
Standard deviation is a statistical measure of dispersion that quantifies how much individual data points vary from the arithmetic mean. A small standard deviation indicates that values are clustered closely around the average, suggesting high consistency. A large value shows that data is

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spread out over a wide range. It is a fundamental tool for assessing data variability and reliability in geographic and scientific research.

142. (C) There is no significant difference between the two group means.
In a t-test, the null hypothesis typically states that there is no statistically significant difference between the means of the two groups being compared. It serves as the baseline assumption that any observed difference is due to chance or sampling error. Researchers then use statistical evidence to determine if they can reject this hypothesis in favor of an alternative that suggests a real difference exists.

143. (D) Stratified sampling
Stratified sampling involves dividing a population into distinct, non-overlapping subgroups, or strata, based on specific characteristics like urban, suburban, or rural status. A random sample is then selected from each stratum. This procedure ensures that each subgroup is adequately represented in the final sample, which is particularly useful when researchers believe that the study variables may vary significantly between these different geographic or social categories.

144. (A) Dependent variable
In regression analysis, the dependent variable is the factor being studied or predicted. Its value is expected to change in response to variations in one or more independent variables. For example, if predicting exam scores based on study time, the score is the dependent variable. Identifying these roles correctly is fundamental for building mathematical models and understanding cause-and-effect relationships within a given dataset.

145. (B) Group a set of objects in such a way that objects in the same group are more similar to each other than to those in other groups.
Cluster analysis is a multivariate statistical technique aimed at identifying natural groupings within a dataset. The goal is to organize objects into clusters where members of each group share high similarity across multiple variables while being distinct from members of other groups. This exploratory method is widely used in geography for regional classification, market segmentation, and identifying patterns in complex socio-economic or environmental information.

146. (A) P-4, Q-1, R-2, S-3
Statistical techniques serve specific analytical purposes. A t-test compares the means of two groups, while ANOVA evaluates differences among three or more group means. The Chi-square test is used to assess associations between categorical variables. Regression analysis provides the mathematical framework for predicting a dependent variable based on known factors. Matching these techniques to their primary objectives is essential for selecting the correct statistical tool.

147. (D) A geologically stable area with uniform lithology and gentle slopes.
A very low bifurcation ratio, typically around two, is often characteristic of drainage basins in geologically stable areas with uniform lithology and gentle slopes. In such regions, the drainage network develops in a simple, orderly fashion with minimal structural disturbance or complex branching. This ratio reflects a lack of significant structural control, indicating that fluvial processes are operating on a relatively homogeneous and flat geographic surface.

148. (A) The square of the basin length.
The form factor is a dimensionless morphometric parameter calculated by dividing the total area of a drainage basin by the square of its axial length. This ratio provides a quantitative index of the basin's shape, specifically its degree of elongation. By standardizing area relative to length, the form factor allows geomorphologists to compare the geometric properties of different basins and predict their hydrological responses to rainfall.

149. (C) Youthful, mature, and old stages of erosion from bottom to top.
The characteristic S-bend shape of a typical hypsographic curve represents the different stages of erosion within a landscape. When viewed from bottom to top, the curve segments correspond to the youthful, mature, and old stages of geomorphological development. This visualization reflects the distribution of land area at various elevations, providing a clear summary

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of how the terrain has been reshaped by erosional processes over geological time.

150. (C) Choropleth Map
A choropleth map is characterized by the use of different shades or patterns of color within predefined administrative boundaries to represent statistical data. Higher values are typically depicted with darker shades, making it ideal for visualizing density or percentage-based variables like population or literacy. This thematic mapping technique provides an effective way to compare geographic units and identify regional trends while maintaining a clear spatial structure.

151. (C) The geographic location and extent of the area to be mapped.
The primary consideration when choosing a map projection is the geographic location and the total extent of the area being mapped. Different projections are designed to minimize distortion for specific regions, such as the poles, the equator, or mid-latitude areas. By selecting a projection that fits the map's location and size, cartographers can more accurately represent essential geometric properties like shape, area, or distance.

152. (D) Analysis function
An overlay operation in a geographic information system is a fundamental analysis function that combines multiple spatial layers to identify relationships or create new data. By vertically stacking maps, such as soil types and land use, users can find areas where specific criteria intersect. This analytical process is essential for suitability mapping, environmental modeling, and spatial decision support, moving beyond simple data storage to derive meaningful geographic.

153. (A) Both A and R are true and R is the correct explanation of A.
Active remote sensing systems, such as radar, are capable of acquiring images at any time because they generate their own source of electromagnetic radiation. Unlike passive systems that rely on reflected sunlight, active sensors illuminate the target themselves and record the return signal. This independence from solar energy allows for consistent monitoring during both day and night and through various atmospheric conditions like clouds or haze.

154. (B) Oblique aerial photographs provide a more natural, side-view perspective.
Oblique aerial photographs are taken with the camera axis tilted at an angle, which offers a side-view of the terrain and features. This perspective is more natural to the human eye, providing a sense of depth and making structures like buildings easier to recognize. While vertical photographs are better for precise mapping and measurements, oblique images are highly valuable for reconnaissance, architectural studies, and general visualization of landforms.

155. (C) To provide a framework for making population decisions based on sample data.
Hypothesis testing plays a vital role in the scientific method by providing a structured framework for making inferences about a larger population using sample data. It allows researchers to evaluate specific claims or theories and determine if observed results are statistically significant rather than due to chance. By formalizing the decision-making process, hypothesis testing helps in drawing generalized conclusions and advancing knowledge across diverse scientific disciplines.

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156. (D) A perfect positive linear relationship.
A correlation coefficient of positive one indicates a perfect positive linear relationship between two variables. This means that as one variable increases, the other variable increases in a perfectly consistent and predictable manner. On a scatter plot, all data points would fall exactly on a straight line with a positive slope. While rare in real-world data, this value serves as the theoretical upper limit for the strength of correlation.

157. (A) Selection, normalization, and aggregation of multiple indicators.
Computing a composite index, such as the Human Development Index, involves three core processes: selecting relevant indicators, normalizing them to be scale-free, and finally aggregating them into a single score. This synthesis allows for a multi-dimensional comparison of complex concepts across different regions or time periods. By combining diverse factors like health, education, and income, a

development of a high drainage density, resulting in a finely dissected landscape with a dense network of river channels.

174. (A) A landscape with efficient surface runoff and fine drainage texture.
A high drainage frequency value indicates a large number of individual stream segments per unit area, suggesting a landscape with efficient surface runoff and a fine drainage texture. This condition often results from impermeable surface materials and steep slopes, which prevent water from infiltrating the ground and promote the rapid formation of numerous small channels. Drainage frequency provides important insights into the hydrological efficiency and erosional complexity.

175. (D) 4 only
Quantitative expressions of a drainage basin's shape are specifically provided by parameters like the basin circularity ratio and the form factor. These dimensionless indices allow geomorphologists to describe how compact or elongated a basin is by comparing its geometry to circles or other standard shapes. While other measures like drainage density or stream order describe the network's texture or hierarchy, only shape indices directly quantify the overall basin configuration.

176. (C) P-4, Q-1, R-2, S-3
Geographical curves serve distinct analytical roles. The hypsographic curve relates elevation to cumulative area, while the clinographic curve relates slope distribution to area. The altimetric frequency graph represents the frequency distribution of different elevations within a region. Lastly, a longitudinal profile shows elevation changes along the course of a river. Correctly matching these curves to their functions is essential for understanding topographic and geomorphological analysis in spatial studies.

177. (C) Non-spatial data
A dataset containing state names and their corresponding population figures is a classic example of non-spatial data. While it describes geographical entities, the data itself is tabular and lacks explicit coordinate information or geometric definitions. In a geographic information system, this information serves as attribute data that must be linked to a separate spatial file, such as a state boundary polygon, before it can be mapped or spatially.

178. (A) Thematic cartography
Creating a map that visualizes land use categories using different colors is a primary application of thematic cartography. This branch of map-making focuses on representing the spatial distribution of a specific theme or subject. By using color-coded regions, geographers can effectively communicate complex spatial information about land cover, making it easy to identify patterns and relationships across a landscape. Thematic maps are essential for planning and environmental monitoring.

179. (B) Oblique aerial photograph
An image captured with the camera axis intentionally tilted fifteen degrees from the vertical is classified as an oblique aerial photograph. This angle provides a side-view perspective of the ground, which is more natural and provides better visualization of structures and topography compared to vertical shots. Oblique photographs are excellent for general reconnaissance and architectural analysis, as they offer a sense of depth and scale that vertical images often lack.

180. (C) Digital Image Processing
Digital Image Processing encompasses the range of techniques used to enhance the visual quality of an image and extract specific information. This includes applying filters to remove noise, enhancing contrast to highlight features, and performing radiometric or geometric corrections. In remote sensing, these processes are essential for transforming raw satellite signals into usable, high-quality images that support accurate interpretation and spatial analysis of the Earth's surface features.

181. (B) 2, 3 and 4
Key geographical techniques include georeferencing, which assigns real-world coordinates to maps, and photogrammetry, which involves making precise measurements from photographs. Isarithmic maps are used to connect points of equal value for continuous data. However, a Digital Elevation Model is a raster representation of terrain rather than a

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these systems move beyond simple map display to offer deep insights that support informed, data-driven planning and policy development in various disciplines.

166. (A) Radiometric resolution
Radiometric resolution determines the number of gray levels or bits used to record the intensity of electromagnetic radiation. A satellite with 256 levels (8-bit) has higher radiometric resolution than one with 64 levels (6-bit), meaning it can detect and distinguish much finer differences in energy. This increased sensitivity is crucial for identifying subtle features on the Earth's surface and improving the overall quality and interpretability of satellite-based imagery.

167. (B) 2, 1, 3
The electromagnetic spectrum is organized by wavelength, with visible light being shorter than infrared radiation, and microwaves being significantly longer than both. Short wavelengths have higher frequencies, while long wavelengths like microwaves have lower frequencies. Understanding this sequence is fundamental to remote sensing, as different sensors are designed to detect specific regions of the spectrum based on how various wavelengths interact with and are reflected by the Earth's features.

168. (C) Space Segment - Processes satellite imagery.
The space segment of the Global Positioning System is responsible for broadcasting navigation signals from orbiting satellites, not for processing satellite imagery. Image processing is typically handled by specialized ground-based software. The ground control segment monitors satellite health, and the receiver segment processes signals to determine position. Misidentifying the function of the space segment can lead to a misunderstanding of how GPS and remote sensing technologies differ.

169. (D) Negatively skewed.
When the median of a dataset is significantly higher than its mean, the distribution is likely negatively skewed. This indicates that there are several very low values, or a "long tail," on the left side of the distribution which pull the mean downward. In such cases, the majority of data points are concentrated on the right. Recognizing skewness is important for selecting the correct statistical methods and interpreting data patterns.

170. (A) The data must be categorical.
Conducting a standard one-way ANOVA requires several assumptions: the data must be continuous rather than categorical, the samples must be independent, and the populations should be normally distributed. Additionally, the populations must have equal variances, a condition known as homogeneity of variances. If these assumptions are violated, the results of the ANOVA may be unreliable, and researchers might need to consider alternative non-parametric statistical procedures.

171. (B) It ensures that indicators with large absolute values do not dominate the index.
Making indicators scale-free through normalization is a critical step in index construction. It transforms variables with different units and magnitudes into a common, dimensionless scale. This ensures that an indicator with naturally large values, such as GDP, does not disproportionately influence the final composite score compared to an indicator with smaller values, such as life expectancy. Normalization creates a fair and balanced aggregation of diverse information.

172. (B) Cluster Analysis
Cluster analysis is the appropriate multivariate technique for grouping neighborhoods based on multiple socio-economic variables like income, house prices, and education. It identifies natural patterns of similarity, allowing geographers to classify regions into distinct types. By organizing complex data into meaningful groups, cluster analysis helps in understanding regional disparities and tailoring urban planning strategies to the specific needs and characteristics of different neighborhood segments.

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173. (A) Both A and R are true and R is the correct explanation of A.
Drainage density is significantly influenced by both climate and the underlying lithology of a drainage basin. Regions characterized by high rainfall provide more surface water for channel formation, while impermeable rock prevents infiltration, forcing water to flow over the surface as runoff. Together, these factors lead to the

between them. This non-parametric approach is ideal for analyzing survey data where variables are classified into distinct groups rather than measured on a continuous numerical scale.

126. (A) What is the trend in annual rainfall in a region over the last 50 years?
Time series analysis is specifically designed to study data points recorded over successive time intervals to identify trends, cycles, or seasonal variations. Analyzing annual rainfall over fifty years is a classic application of this technique, as it focuses on historical patterns to understand temporal change. This method provides the analytical framework necessary for climate monitoring and forecasting, helping geographers detect long-term environmental shifts within a region.

127. (B) Regression Analysis
Regression analysis is the appropriate statistical method for predicting the value of a dependent variable, such as an exam score, based on an independent variable like study hours. By establishing a mathematical relationship between the factors, researchers can estimate how changes in one influence the other. This predictive power makes regression a vital tool in various fields for modeling outcomes and understanding the strength of associations between variables.

128. (B) To reduce a large set of correlated variables into a smaller set of uncorrelated components.
Principal Component Analysis is a multivariate technique used in geographical research to simplify complex datasets. It reduces a large number of correlated variables into a smaller set of uncorrelated factors called principal components. This process retains the majority of the original data's variance while making it easier to identify underlying patterns. PCA is essential for managing high-dimensional data, facilitating clearer visualization and more efficient spatial modeling.

129. (D) 1, 2, 3, 4, and 5
Morphometric analysis involves several interrelated parameters that describe a drainage basin's characteristics. Drainage density and frequency measure the texture of the network, while the bifurcation ratio relates stream orders. Shape measures like circularity and form factor indicate elongation. Together, these metrics provide insights into the basin's geological structure and hydrological behavior, with high drainage density often reflecting impermeable surfaces and steep terrain. All these statements are correct.

130. (D) Longitudinal profile
A longitudinal profile is a graphical representation that shows the elevation of a riverbed along its entire course, from the source to the mouth. By plotting altitude against distance, it reveals the river's gradient and identifies features like waterfalls, rapids, or flat plains. This profile is a fundamental tool for understanding river dynamics, erosional stages, and the overall balance between geological uplift and fluvial processes.

131. (A) The gradient, or degree of steepness, of the ground surface.
Slope analysis in geography focuses on calculating the gradient, which represents the degree of steepness or inclination of the ground surface. By quantifying how elevation changes over a specific distance, researchers can assess landform stability, soil erosion risk, and suitability for various land uses. This analytical approach is essential for topographic mapping and environmental planning, providing the necessary metrics to describe the vertical complexity of the terrain.

132. (B) The landscape is in a youthful stage of erosion with steep-sided valleys.
A hypsographic curve with a steep slope at lower elevations and a gentle slope at higher elevations typically indicates a youthful landscape characterized by deep, steep-sided valleys and extensive upland areas. This shape reflects a stage of erosion where rivers have cut deeply into the terrain but have not yet widened their valleys significantly. Such curves help geomorphologists interpret the maturity and erosional history of a region.

133. (D) A false but R is true.
While a geographic information system can produce high-quality digital maps, its core strength lies far beyond simple visualization. The true power of GIS is its ability to perform complex spatial analysis by integrating multiple layers of

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vector one. Therefore, the statements concerning georeferencing, photogrammetry, and isarithmic mapping are correct, providing the foundation for accurate spatial analysis and visualization.

182. (B) t-test
The most appropriate statistical procedure for testing the difference between the mean heights of two groups, such as male and female students, is the t-test. This test specifically evaluates whether the observed difference in averages is statistically significant or if it could have occurred by chance. By accounting for the sample size and the variability within each group, the t-test provides a reliable way to make inferences about population differences.

183. (A) A set of principal components, which are linear combinations of the original variables.
The primary output of a Principal Component Analysis is a set of new, uncorrelated variables called principal components. These components are mathematical linear combinations of the original variables and are ordered by the amount of variance they explain. By focusing on the first few components, researchers can reduce the dimensionality of their data while retaining most of the important information, simplifying subsequent analysis and helping to identify underlying patterns.

184. (D) Drainage Density
Drainage density is a fundamental morphometric parameter calculated by dividing the total length of all stream channels within a basin by the basin's total area. This ratio provides a measure of how well or how densely a basin is drained by its stream network. It is influenced by environmental factors such as climate, vegetation, and soil permeability, and is a key indicator of surface runoff efficiency and landscape dissection.

185. (B) Hypsographic Curve
A hypsographic curve is a specialized graph used to show the relationship between elevation and the percentage of a basin's area that lies at or above that altitude. By plotting cumulative area against height, it provides a comprehensive overview of the vertical organization of a landscape. This tool is essential in geomorphology for assessing the distribution of mass and identifying the overall erosional stage of a geographic region or drainage basin.

186. (C) Hypsographic Curve
While pie diagrams, bar diagrams, and line graphs are common techniques for representing data on maps, the hypsographic curve is a specialized geomorphological tool for analyzing elevation distribution rather than a general data representation method. It is used to summarize topographic information within a basin. The other techniques are widely applied in thematic cartography to visualize statistical comparisons, proportions, and trends across geographic units, facilitating easier interpretation of mapped data.

187. (D) Vector
The vector data format is the most efficient choice for storing the exact boundaries of geographic features like countries. By using a series of precisely defined coordinates to create polygons, it can represent clear edges with high geometric accuracy. Unlike raster formats that rely on a grid of cells, vector data maintains the integrity of shapes regardless of scale, making it the standard for mapping administrative limits and discrete spatial features.

188. (A) Both A and R are true and R is the correct explanation of A.
Temporal resolution is a critical factor for monitoring dynamic environmental phenomena because it refers to the frequency at which a satellite revisits a location. High temporal resolution means more frequent data acquisition, allowing researchers to observe rapid changes like flood progression or crop growth over short periods. This consistent stream of imagery is essential for disaster management and agricultural planning, where timely information is necessary for effective decision-making and response.

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189. (D) Association
Association is an element of image interpretation that relies on the relationship between a feature and other recognizable objects in its vicinity. For example, a rectangular building located next to a series of tracks is often interpreted as a railway station. By identifying features that are typically found together, analysts can make more accurate classifications and gain a deeper understanding

of the land use and human activity within an image.

190. (A) To determine the precise geographic location of features on the Earth's surface.
The primary application of Global Positioning System technology in geography is to determine the precise latitude, longitude, and altitude of features on the Earth's surface. By receiving signals from a constellation of satellites, GPS devices allow for accurate mapping, navigation, and surveying. This spatial information is foundational for creating geographic datasets, facilitating field research, and ensuring that all data in a information system is correctly located within a standard coordinate frame.

191. (B) Negatively skewed
A dataset where the mean is significantly lower than the median and mode is characterized as negatively skewed. This pattern indicates that the distribution has a "long tail" of low values on the left side, which pulls the arithmetic average downward. Most of the data points are concentrated at higher values on the right. Recognizing skewness is vital for understanding data distribution and for choosing the most appropriate statistical measures and tests.

192. (C) Chi-square test
The Chi-square test is the most suitable statistical procedure for investigating the independence between political party choice and residence region, as both are categorical variables. By comparing the observed frequencies in each category to the frequencies expected if no relationship existed, the test determines if there is a significant association. This non-parametric approach is ideal for analyzing nominal data and identifying patterns in survey-based geographical or social research.

193. (A) Provide a multi-dimensional measure of complex concepts like development.
The purpose of a composite index is to create a single, synthesized score from multiple individual indicators to measure complex, multi-dimensional concepts like development or sustainability. By aggregating diverse variables, such as income, health, and education, it provides a more comprehensive overview than any single metric. This allows for easier comparison between different regions and helps policymakers identify overall trends and disparities across various social and economic dimensions.

194. (D) A Digital Elevation Model (DEM) or a detailed topographic map.
Morphometric analysis of a drainage basin requires accurate information about surface terrain and stream networks, typically derived from a Digital Elevation Model or a detailed topographic map. These inputs provide the elevation and horizontal data necessary to calculate parameters like drainage density, slope, and basin shape. Without a high-quality representation of the landscape, researchers cannot perform the quantitative measurements needed to characterize the physical and hydrological structure of the basin.

195. (A) Both Statement I and Statement II are correct.
A low form factor value indicates a highly elongated basin shape, which significantly influences its hydrological behavior. Elongated basins generally have a more prolonged and lower flood peak because it takes longer for rainfall from the distant parts of the watershed to reach the outlet. In contrast, circular basins facilitate the simultaneous arrival of runoff from all areas, leading to more rapid and higher peak discharges. Understanding these shape-runoff relationships is vital for management.

196. (B) The former plots slope against area, while the latter plots elevation frequency.
A clinographic curve and an altimetric frequency graph serve different purposes in topographical analysis. The clinographic curve relates the angle of slope to the percentage of land area characterized by that slope, providing a summary of terrain gradients. In contrast, the altimetric frequency graph plots the frequency of occurrence for different elevation values, often as a histogram. Both tools are essential for characterizing the vertical and slope-based complexity of a landscape.

197. (C) An aerial photograph.
An aerial photograph is an inherently spatial source of information because it captures a visual record of the Earth's surface where every point corresponds to a physical location. Unlike census tables or descriptions, which provide non-spatial

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attributes about places, an aerial image provides the direct geometric context of the landscape. This allows it to be georeferenced and used for precise measurements of distance, area, and location within a geographic system.

198. (B) 1, 2, 3, 4, and 5
Cartography utilizes a variety of specialized mapping techniques to visualize different types of data. Choropleth, isarithmic, and dasymetric maps are used for statistical and continuous data, while flow maps show movement between locations. Chorochromatic maps are applied to represent qualitative differences, such as political boundaries. Together, these five techniques provide a comprehensive toolkit for geographers to effectively communicate diverse spatial information and identify regional patterns and trends.

199. (D) Points, lines, and polygons
In geographic information systems, the raster data model uses a grid of uniform cells to represent features, whereas the vector data model uses discrete geometric objects—points, lines, and polygons—defined by precise coordinates. While rasters are well-suited for continuous phenomena like elevation, vectors are ideal for representing discrete features with clear boundaries, such as roads or district limits. This fundamental distinction in data structure determines how spatial information is stored and analyzed.

200. (A) Aid decision-makers by providing tools to explore spatial problems.
The primary goal of a Spatial Decision Support System is to provide decision-makers with a robust set of tools and models to explore and solve complex geographic problems. By integrating spatial data analysis with multi-criteria evaluation techniques, these systems facilitate the evaluation of various scenarios and their potential impacts. This comprehensive approach supports more informed and effective planning, helping to navigate semi-structured decisions that involve diverse environmental, social, and economic.

201. (B) Radiometric resolution
Radiometric resolution in remote sensing refers to the sensitivity of a sensor to detect very fine differences in the intensity of electromagnetic energy. It is determined by the number of gray levels used to record the recorded signal. Higher radiometric resolution allows for the discrimination of subtle variations in brightness, which is essential for identifying features with similar spectral properties and improving the overall precision and interpretability of satellite-based data and imagery.

202. (C) 1 → 2 → 3
The Global Positioning System operates through a sequence where signals travel through three main segments. They are generated in the space segment by satellites, monitored and corrected by the ground control segment, and finally received and processed by the user's receiver segment. This flow ensures that accurate timing and orbital data are transmitted and correctly interpreted to provide the user with precise three-dimensional position coordinates and highly accurate time information.

203. (D) Range
The range is the simplest measure of dispersion and is the most sensitive to extreme outliers because it is calculated solely as the difference between the maximum and minimum values in a dataset. A single exceptionally high or low value will immediately change the range, regardless of the distribution of the other data points. In contrast, measures like standard deviation or interquartile range are more robust as they consider more of the data.

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204. (A) Is there a difference in the mean rainfall across four different climatic zones?
Analysis of Variance is the appropriate statistical procedure for comparing the means of three or more independent groups. In this case, it is used to determine if significant differences in average rainfall exist across four distinct climatic zones. By evaluating the variance both within and between these groups, ANOVA helps researchers assess whether the observed differences are likely due to real regional factors or simply reflect random sampling variation.

205. (A) P-3, Q-4, R-1, S-2
Statistical analyses serve specific research objectives. Correlation analysis measures the strength of linear relationships between variables, while time series analysis examines

spatial interactions. This makes them ideal for representing complex economic data like trade volumes across international borders or within specific continental regions.

252. (A) Isarithmic map
Isarithmic maps are employed to visualize continuous phenomena that vary smoothly over a geographic surface. These maps use lines to connect points of equal value, representing data such as elevation, temperature, or precipitation levels. Because rainfall does not stop at administrative boundaries and changes gradually, this technique provides a precise and accurate representation of climatic patterns across a regional landscape.

253. (C) It uses ancillary information to refine boundaries beyond administrative units.
Dasymetric mapping represents a sophisticated refinement of the traditional choropleth method by incorporating ancillary data to delineate areas of homogeneous values. While choropleth maps rely on arbitrary administrative or statistical units, dasymetric maps use additional information to create more accurate boundaries. This approach improves the spatial resolution of the data, providing a more realistic representation of the actual distribution patterns.

254. (D) Chorochromatic mapping
Chorochromatic mapping is a cartographic technique used primarily for representing qualitative or categorical data across a geographic area. Each distinct category, such as specific soil classifications or land use types, is assigned a unique colour or pattern to differentiate it from others. This method effectively visualizes spatial distributions of non-numerical data without implying any quantitative order or magnitude between the classes.

255. (C) Statement I is false, but Statement II is true.
Choropleth maps are designed for discrete data tied to administrative units rather than continuous phenomena like air pressure, which requires isarithmic lines. However, dasymetric mapping is recognized as a significant enhancement of the choropleth technique because it uses auxiliary data to refine spatial boundaries. Consequently, the assertion regarding continuous data is inaccurate, while the characterization of dasymetric maps remains valid.

256. (B) Vector data format
Vector data format represents geographic features using precise coordinate geometry consisting of points, lines, and polygons. This structure is highly efficient for depicting discrete features with clearly defined boundaries and specific paths. Since national highways consist of specific routes with exact start and end points, the vector model provides the most accurate way to store and analyze such linear infrastructure networks.

257. (D) Raster data
Raster data structures utilize a grid-based system where the entire study area is divided into individual cells or pixels. Each pixel contains a specific value representing an attribute or category, such as land cover types or elevation. This format is the standard for satellite imagery because it captures continuous data and facilitates complex spatial analysis of surface characteristics through cell-by-cell processing.

258. (A) To provide descriptive, non-spatial information about geographic features.
Attribute data serves as the non-spatial component within a geographic information system, providing essential descriptive details about specific spatial features. While spatial data defines location and geometry, attribute data stores thematic information in tabular formats. This allows researchers to query and analyze characteristics such as population statistics, river names, or soil properties associated with the points, lines, or polygons.

259. (C) Editing
Editing functions within a geographic information system allow users to update, correct, or refine existing spatial and attribute data. When a geographer modifies the boundaries of a polygon feature to improve its accuracy, they are performing an editing task. This process ensures that the digital representation of geographic features remains current and precisely reflects the real-world conditions or updated surveyor measurements.

260. (A) Administrative boundaries of districts - Vector format

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the integration of diverse and massive remote sensing datasets from multiple sources. These platforms allow for a more comprehensive analysis of environmental trends, such as deforestation or water resource changes, across large spatial and temporal scales. By providing access to high-volume data, they enable more informed and collaborative decision-making, helping to address complex ecological challenges with greater precision and depth.

214. (C) Systematic Sampling
Systematic sampling is a probability sampling procedure that involves selecting individuals from a list or sequence at regular, fixed intervals. Starting from a randomly chosen point, every n-th member is included in the sample. This method is often easier to implement than simple random sampling and ensures an even distribution across the entire population. It is widely used in geography for choosing sites along a transect or individuals from an ordered database.

215. (D) Reject the null hypothesis.
In statistical hypothesis testing, a p-value represents the probability that the observed results occurred by chance under the null hypothesis. With a significance level of 0.05, a p-value of 0.03 is considered statistically significant because it falls below the threshold. This evidence would typically lead the researcher to reject the null hypothesis, concluding that the findings are likely due to a real effect or difference rather than random variation in the data.

216. (A) Logistic Regression
Logistic regression is the appropriate advanced statistical technique for building a model where the dependent variable is categorical, such as the occurrence or non-occurrence of a landslide. Unlike simple linear regression, it is designed to predict the probability of an event based on several independent factors like slope, soil, and rainfall. This method is essential in environmental risk assessment and spatial modeling for predicting binary outcomes in complex geographic systems.

217. (B) Principal Component Analysis
Principal Component Analysis is a powerful multivariate technique specifically used for data reduction in large datasets. It transforms a set of many correlated variables into a smaller number of uncorrelated components while retaining as much of the original variance as possible. This simplification helps researchers identify the most important patterns and factors without losing significant information, making it easier to visualize and analyze complex high-dimensional geographic and environmental information.

218. (D) 1 and 4
In morphometric analysis, high drainage density is correctly interpreted as a sign of impermeable surfaces where runoff forms many channels. Similarly, a high circularity ratio, being close to one, correctly indicates a compact, circular basin. However, a low bifurcation ratio typically suggests a simple, stable terrain, not a complex one. A high form factor indicates a circular shape, while a low value signifies elongation. Thus, only pairs one and four are correctly matched.

219. (D) A profile across a river valley.
A transverse profile in geomorphology is a graphical representation that shows a cross-section of a landform, specifically across a river valley, perpendicular to the flow. It illustrates the shape of the valley walls and the riverbed, providing insights into the processes of lateral erosion and valley widening. These profiles are essential for understanding local terrain variations, analyzing floodplains, and assessing suitability for engineering projects like bridges or dams across a channel.

220. (A) The percentage of the land area that has a certain degree of slope.
The key information derived from a clinographic curve is the distribution of gradients across a landscape, showing the specific percentage of the land area characterized by different degrees of slope. This graphical tool provides a clear summary of topographical complexity and is essential for identifying dominant landform levels. By quantifying slope distribution, researchers can better understand erosional processes, assess surface runoff behavior, and identify areas of potentially high terrain instability.

221. (B) 1, 2 and 3
Geographic data is composed of spatial information, which has a locational component, and non-spatial data, which describes characteristics. Thematic maps, such as

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data sequenced over successive intervals. Cluster analysis is used to identify natural groupings or patterns within a dataset. Principal Component Analysis focuses on reducing data dimensionality to simplify interpretation. Correctly matching these analysis types with their objectives is essential for selecting the appropriate methodology in geographic and scientific studies.

206. (B) The hierarchical classification of stream segments within a drainage network.
Ordering of streams refers to the systematic and hierarchical classification of river segments within a drainage network based on their position and complexity. Systems like Strahler's or Horton's assign numerical values to identify the status of each channel, starting from fingertip tributaries. This classification is fundamental for quantitative geomorphology, allowing researchers to compare drainage systems and understand hydrological properties, such as basin response and the scale of the fluvial.

207. (A) A faster hydrograph response to a storm event compared to an elongated basin of the same area.
A drainage basin with a circularity ratio close to one is more compact in shape, which typically leads to a faster and higher peak hydrograph response. Because all parts of a circular basin are roughly equidistant from the outlet, surface runoff generated during a storm event arrives at the mouth almost simultaneously. In contrast, an elongated basin experiences a more attenuated response as water must travel significantly longer distances from distant upstream areas.

208. (A) Both A and R are true and R is the correct explanation of A.
A hypsographic curve provides vital insights into the erosional stage of a landscape by illustrating how land area is distributed across different elevations. The specific shape of the curve, such as its convexity or concavity, reflects how mass has been redistributed by erosional processes over time. Geomorphologists use these shapes to distinguish between youthful, mature, and old landscapes, helping to interpret the geological and structural history of a geographic region.

209. (D) Bar Diagram
A bar diagram is the most appropriate graphical tool for comparing the number of tourists across three distinct national parks. Its simple structure allows for a clear visual comparison of discrete categories, making it easy to identify which park had the highest or lowest visitation. This diagram type is highly effective for presenting non-continuous data where the primary goal is to show differences in quantity between independent entities or groups.

210. (C) Georeferencing
The concept of a datum is fundamental to the process of georeferencing because it provides the mathematical reference frame for defining geographic coordinates. It establishes the Earth's shape and the origin point for latitude and longitude. Without a specific datum, coordinates would be inconsistent, and raw data could not be accurately anchored to its correct real-world location. Choosing an appropriate datum ensures that all spatial layers in a GIS align precisely.

211. (D) High spectral resolution
High spectral resolution is essential for distinguishing between spectrally similar features, such as different types of vegetation, because it involves recording energy in many narrow wavelength bands. By capturing fine spectral details, sensors can detect subtle differences in reflectance that are unique to specific species or plant conditions. This sensitivity allows researchers to identify land cover more accurately, which is a critical task in agriculture, forestry, and environmental management.

212. (A) Aerial photographs and satellite images
Photogrammetry is the scientific discipline dedicated to obtaining reliable measurements and 3D information from aerial photographs and satellite images. By applying geometric principles to these images, it allows for the precise determination of the size, shape, and location of ground features. This science is a foundational tool for topographic mapping, engineering surveys, and creating digital elevation models, playing a vital role in modern cartography and various spatial analysis applications.

213. (B) Allow for more comprehensive and integrated analysis using diverse remote sensing datasets.
Big Data sharing platforms significantly enhance natural resource management by facilitating

as where specific soil types coincide with certain land uses. Unlike editing or conversion tasks like digitizing or importing files, overlay operations derive new spatial insights and support complex decision-making processes, making them essential for environmental modeling and site suitability assessments in geographic research.

230. (C) Spectral resolution
Spectral resolution refers to a sensor's ability to differentiate between specific intervals of the electromagnetic spectrum. A satellite that can record separate, narrow bands for green, red, and blue light has higher spectral resolution than a panchromatic sensor that only records in black and white. This increased detail allows researchers to identify subtle differences in the reflectance of Earth's features, which is critical for mapping diverse land cover types and assessing vegetation health.

231. (B) GPS Ground Segment - User's handheld device
The Global Positioning System consists of three segments: space, ground control, and receiver. The ground control segment is composed of master control and monitor stations that manage the satellites, while the receiver segment includes all user devices, such as handheld units or smartphones. Incorrectly identifying the ground segment as the user's device is a common misunderstanding of the system's structure. The space segment transmits signals, and the receiver segment processes them for navigation purposes.

232. (A) Time Series Analysis
Time series analysis is the most appropriate statistical method for studying trends in annual monsoon rainfall over several decades. This technique focuses on data points recorded at successive time intervals to identify long-term patterns, cycles, and seasonal variations. By analyzing seventy years of historical data, geographers can detect significant shifts in climate behavior and develop models for future forecasting, providing essential information for regional water management and agricultural planning in India.

233. (D) A set of groups or clusters, where members of each group are similar to one another.
The final output of a cluster analysis is a set of distinct groups, or clusters, where objects within each group exhibit high similarity across multiple variables. This multivariate technique is used for exploratory classification, helping researchers identify natural patterns and structures within complex datasets. By organizing observations into clusters that are internally homogenous and externally heterogeneous, analysts can gain insights into regional types, demographic segments, and diverse spatial or environmental groupings.

234. (A) High drainage density and high drainage frequency.
A drainage basin characterized by impermeable surfaces and a high degree of dissection will naturally have a dense network of stream channels. This results in both high drainage density, which measures total stream length per unit area, and high drainage frequency, which measures the number of stream segments per unit area. These metrics indicate a landscape with efficient surface runoff and poor infiltration, typically leading to rugged topography and rapid hydrological responses during rainfall.

235. (B) Show the frequency of occurrence of different elevation zones in a region.
An altimetric frequency graph is a statistical tool used to visualize how often different elevation values occur within a specific geographic region. By presenting elevation data as a histogram, it identifies the dominant topographic levels, such as extensive plains or plateaus. This method provides a clear summary of the vertical distribution of the landscape, helping researchers understand the overall topographic structure and identify significant landform features across a study area or drainage basin.

236. (B) Isarithmic
Isarithmic maps are specifically designed to represent continuous geographic phenomena that change smoothly across a surface, such as air pressure or temperature. By using lines called isolines to connect points of equal value, these maps reveal spatial gradients and patterns without the need for discrete administrative boundaries. This technique is essential in meteorology and environmental science for visualizing fields that

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over time, such as vegetation growth, urban expansion, weather patterns, or floods.

269. (C) Spectral signature
Every Earth-surface feature interacts with electromagnetic radiation in a unique manner, reflecting, absorbing, or emitting energy at different wavelengths. This characteristic pattern is known as a spectral signature. Remote sensing specialists use these signatures to identify and differentiate between various materials, such as water, soil, and different types of vegetation, based on the specific way they appear across bands.

270. (D) High spatial resolution
Spatial resolution refers to the size of the smallest discernible object or area captured in a single pixel of an image. High spatial resolution means that each pixel represents a smaller area on the ground, providing greater detail. This is the most critical factor for identifying small, individual features like buildings in dense urban environments where features are closely spaced together.

271. (C) Pattern
Pattern refers to the spatial arrangement of objects within an image, which can often be described as being regular, random, or clustered. Man-made features, such as the grid-like streets of a planned city or the rows of trees in an orchard, exhibit distinctive patterns that aid in identification. Interpreters use these systematic arrangements to distinguish between natural and human-influenced landscapes.

272. (B) Shadow
Shadow is an interpretive element that reveals the profile and height of objects in an aerial photograph or satellite image. By measuring the length and orientation of the dark area cast by a feature, such as a tower or building, geographers can calculate its vertical dimensions. Additionally, shadows provide visual clues about the shape of objects that might otherwise appear flat.

273. (D) making precise measurements from photographs.
Photogrammetry is the specialized science and technology used to obtain reliable and precise measurements from photographs. It involves using geometric principles to derive quantitative data such as distances, areas, and elevations from images. This field is essential for creating accurate maps and topographic models, particularly when working with vertical aerial photography where precise spatial data is required for analysis.

274. (A) Texture
Texture in image interpretation describes the perceived smoothness or roughness of a surface based on the frequency of tonal changes. A calm water body appears smooth because it has a uniform tone, while a forest canopy looks coarse due to the shadows and varying reflections from individual trees. This element helps researchers identify different land cover types based on their characteristics.

275. (C) Association
Association refers to the relationship between different geographic features that often occur together. Identifying a school building based on its proximity to playgrounds or sports fields is a classic example of using association for interpretation. This element relies on the context of the surroundings to confirm the identity of a feature, as certain objects are logically found near related uses.

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276. (A) The median
The median is the middle value in an ordered dataset and is highly resistant to the influence of extreme outliers. When dealing with property values that include a few exceptionally high prices, the mean can be significantly pulled upward, giving a misleading representation of typical values. The median provides a more accurate central measure for skewed distributions by focusing on position.

277. (D) The standard deviation
Standard deviation is a measure of dispersion that quantifies the average distance of each data point in a set from the arithmetic mean. It provides a statistical summary of how spread out the values are. Calculating this for regional rainfall helps geographers understand the variability of precipitation; a high value indicates inconsistent rainfall, while a low value suggests uniform patterns.

244. (A) Choropleth map
A choropleth map uses different patterns or shades of color within predefined boundaries, such as states or districts, to represent statistical values like literacy rates. This technique is ideal for visualizing variations in quantitative data across administrative units. By using distinct symbology to denote different data classes, it allows for quick visual comparison between regions. Choropleth maps are a standard tool in thematic cartography for showing the distribution and density of social and economic variables.

245. (C) GPS receiver manufacturing
Core components of a Geographic Information System include the spatial database, analytical functions like conversion and editing, and processes like georeferencing. These elements allow for the storage, manipulation, and analysis of geographic data. GPS receiver manufacturing, however, is an industrial hardware production process rather than a functional component of the GIS software or methodology itself. While GIS utilizes data from GPS devices, the physical manufacturing of those devices falls outside the scope of GIS technology.

246. (C) 1, 2, 3, and 5
Remote sensing involves a platform carrying a sensor to detect electromagnetic radiation, with data quality defined by spatial, spectral, temporal, and radiometric resolutions. Digital image processing is then used to enhance the resulting imagery for interpretation. Importantly, photogrammetry is closely related to remote sensing, as it provides the geometric principles for making measurements from the acquired images. Therefore, while most statements are correct, the claim that photogrammetry is unrelated is fundamentally inaccurate in a spatial.

247. (B) ANOVA
Analysis of Variance is the appropriate statistical test for determining if the average monthly sales are the same across three different cities. By comparing the means of three independent groups simultaneously, ANOVA assesses whether observed differences in sales figures are statistically significant or likely due to random variation. This test is essential for evaluating performance or characteristics across multiple categories, providing a more robust analytical framework than conducting multiple separate t-tests between pairs of cities.

248. (A) Length
The form factor is a quantitative morphometric parameter that relates a drainage basin's total area to its maximum axial length. Calculated as the ratio of area to the square of the length, it provides a dimensionless index of basin shape, specifically its degree of elongation. This parameter is crucial for geomorphologists and hydrologists because basin shape directly influences the timing and intensity of runoff, with circular basins typically producing more rapid and higher flood discharge peaks.

249. (D) Hypsographic Curve - Shows the relationship between elevation and cumulative area.
In morphometry, the hypsographic curve is correctly used to show the relationship between elevation and the cumulative land area at or above those altitudes. This visualization summarizes the vertical distribution of a drainage basin. In contrast, clinographic curves relate slope to area, and profiles show cross-sections rather than statistical relationships. Altimetric frequency graphs identify dominant topographic levels through histograms. Therefore, the pairing of the hypsographic curve with its relationship between elevation and area is accurate and fundamental.

250. (A) Both A and R are true and R is the correct explanation of A.
Normalization is an essential step in creating a composite index because it transforms indicators with different units and scales into a common, dimensionless format. This process ensures that variables with large absolute values, such as income, do not unfairly dominate the final score compared to variables with smaller ranges, such as life expectancy. By bringing all data to a uniform scale, normalization allows for a fair and balanced aggregation, ensuring the final index accurately reflects multi-dimensional trends.

251. (B) Flow Map
Flow maps are specialized cartographic tools designed to visualize the movement or displacement of objects, people, or information between geographic locations. By utilizing lines or arrows of varying thickness, they effectively illustrate the direction and magnitude of

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vary gradually, providing a clear and intuitive representation of spatial trends and distribution.

237. (A) Photogrammetry
Photogrammetry is the multidisciplinary science and technology used to obtain reliable and precise information about physical objects through the recording and interpretation of photographs. By applying geometric and mathematical principles to aerial or satellite imagery, it allows for the measurement of distances, areas, and three-dimensional landforms. This discipline is fundamental for professional cartography, engineering surveys, and the creation of accurate topographic maps and digital elevation models, serving as a critical bridge between imagery and.

238. (C) 1, 2, and 3
A Geographic Information System is a comprehensive system for capturing, managing, and analyzing spatial data, with thematic cartography serving as a key function. Spatial Decision Support Systems are important applications that leverage GIS capabilities for complex problem-solving. However, GIS is not exclusive to raster data; it also fundamentally utilizes vector models. Therefore, while the first three statements accurately describe the system's nature and functions, the fourth statement incorrectly limits the data formats GIS can handle.

239. (C) The process of selecting a representative subset from a population.
In statistics, sampling is the systematic process of selecting a representative subset of individuals from a larger population for detailed study. This procedure is essential when it is impossible or impractical to study the entire group. By using techniques like random or stratified sampling, researchers can ensure that the sample accurately reflects the population's characteristics, allowing for valid generalizations and inferences to be made about the larger group based on findings.

240. (D) Creating a simplified, multi-faceted measure from various variables.
Computing a composite index involves several structured steps: calculating indices, normalizing indicators to be scale-free, and aggregating them into a single score. This process is designed to create a simplified, multi-faceted measure that represents complex, multidimensional concepts such as human development or environmental sustainability. By synthesizing diverse variables into a single value, researchers and policymakers can more easily compare different regions and track overall progress across multiple social and economic dimensions over.

241. (A) The degree of branching within the stream network.
The bifurcation ratio is a fundamental morphometric parameter that specifically reflects the degree of branching or bifurcation within a stream network. It is calculated by comparing the number of streams between successive orders. This ratio provides valuable insights into the geological structure and structural control within a drainage basin. Typically ranging between three and five for most natural river systems, it helps geomorphologists understand the basin's developmental history and its overall hydrological efficiency.

242. (B) A landscape dominated by plateaus or extensive upland areas.
A hypsographic curve with a large portion in the upper, gentle-slope section indicates a landscape where a significant amount of the total area exists at high elevations. This shape is characteristic of regions dominated by expansive plateaus or extensive upland plains. Such curves help geomorphologists identify specific topographic structures and interpret the erosional history of the terrain, distinguishing between rugged mountainous regions and high-altitude, low-relief surfaces that have not yet been deeply dissected.

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243. (B) Geographic coordinates
The primary distinction between spatial and non-spatial data is the presence of geographic coordinates. Spatial data includes information that identifies the exact physical location of a feature on the Earth's surface using a standard reference system. Non-spatial data, often called attribute data, provides descriptive characteristics about features but lacks locational geometry itself. In a information system, these two types of data are linked to create a comprehensive and searchable representation of the geographic world.

Vector data is ideally suited for representing discrete geographic features with precise boundaries, such as administrative districts or property lines. These features are defined by coordinates that form distinct polygons. In contrast, continuous phenomena like temperature surfaces or elevation models are better represented using raster grids. Choosing the vector format for district boundaries ensures geographical accuracy and facilitates administrative analysis.

261. (D) To assign real-world coordinates to spatial data.
Georeferencing is the essential process of assigning real-world geographic coordinates to digital maps or satellite images. This procedure anchors spatial data to specific locations on the Earth's surface using a defined coordinate system. By establishing this spatial reference, different datasets can be accurately overlaid and integrated within a common analytical framework, enabling precise spatial analysis, measurements, and map production.

262. (B) represent the three-dimensional Earth's surface on a two-dimensional plane.
Map projection is a systematic mathematical transformation used to represent the three-dimensional, curved surface of the Earth onto a two-dimensional flat plane. Because it is impossible to flatten a sphere without stretching or tearing it, every projection introduces some form of distortion in shape, area, distance, or direction. Selecting an appropriate projection is crucial for maintaining accuracy in specific applications.

263. (C) a raster dataset where cell values correspond to surface elevation.
A Digital Elevation Model is a specialized georeferenced dataset typically stored in a raster format. In this structure, the study area is divided into a grid of cells, where each cell value represents the surface elevation at that specific location. These models are fundamental for terrain analysis, hydrological modelling, and visualizing topographical features, providing a continuous digital representation of the landscape.

264. (D) Spatial Decision Support System (SDSS)
Spatial Decision Support Systems integrate georeferenced datasets with advanced analytical models to assist users in solving complex spatial problems. These systems are designed to support decision-making processes for tasks like site selection, resource management, and urban planning. By combining geographic data with modelling capabilities, they help researchers and officials evaluate multiple scenarios and make informed choices based on criteria.

265. (A) A Datum
A datum acts as a mathematical model of the Earth's shape, providing the necessary reference frame for calculating geographic coordinates. It defines the origin and orientation of the coordinate axes used to specify locations. Without a standardized datum, coordinates from different sources would not align correctly. It serves as the foundation upon which coordinate systems and map projections are built.

266. (B) To carry the sensor that captures energy.
In remote sensing, a platform is the vehicle or carrier used to transport a sensor into a position where it can collect data. Common platforms include satellites, airplanes, and drones. The altitude and stability of the platform directly influence the quality of the data captured. By positioning the sensor above the target, the platform enables the recording of reflected or emitted energy.

267. (B) Spectral resolution
Spectral resolution refers to the ability of a sensor to define and distinguish between fine wavelength intervals in the electromagnetic spectrum. A higher spectral resolution means the sensor can detect more and narrower bands, allowing for the identification of subtle differences in the reflected energy of various objects. This capability is essential for creating detailed spectral signatures and accurately classifying features.

268. (A) Temporal resolution
Temporal resolution defines the frequency at which a remote sensing system acquires data for the same geographic area on the Earth's surface. In this case, the sixteen-day interval represents the revisit time of the satellite. High temporal resolution is particularly important for monitoring dynamic processes that change

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population density, are created by integrating both types. However, raster and vector are specifically formats for spatial data, used to represent geometry and locations on the Earth's surface. Therefore, while the first three statements correctly define the nature and integration of data, the fourth statement incorrectly classifies raster and vector formats.

222. (C) Determination of satellite orbital parameters
Geographic Information Systems are applied to a wide range of tasks, including thematic cartography, georeferencing, and spatial decision support. These functions focus on analyzing and visualizing Earth-based data. In contrast, the determination of satellite orbital parameters is a highly specialized task in aerospace engineering and orbital mechanics, occurring before data is even collected by sensors. While GIS uses the resulting data, it is not used to calculate the physical orbits of the satellites themselves.

223. (D) It can operate regardless of solar illumination.
The main advantage of an active sensor, such as radar or lidar, over a passive sensor is its ability to operate independently of solar illumination. Because it provides its own source of energy to illuminate the target, it can acquire data at any time of day or night and can often penetrate atmospheric obstructions like clouds, fog, or smoke. This capability ensures consistent environmental monitoring under conditions where passive sensors would be ineffective.

224. (A) Ground Control Segment
The ground control segment of the Global Positioning System is responsible for maintaining the accuracy of the entire satellite constellation. This includes correcting satellite clock errors and updating the ephemeris data that describes their precise orbits. By monitoring transmissions from Earth, the control segment ensures that satellites provide the most accurate possible information to users. This continuous management is vital for maintaining the high precision and reliability of GPS-based positioning and timing services.

225. (B) Central Tendency
Average income is a measure of central tendency that provides a single value representing the typical or central point of a distribution. By calculating the arithmetic mean, researchers can summarize the economic status of a village and make comparisons with other regions. This statistical measure is fundamental for identifying general patterns and providing a concise overview of the dataset, helping to describe the overall behavior of the population being studied.

226. (B) 4th order
According to Strahler's method of stream ordering, the order of a resulting segment is equal to the order of the higher joining stream if the two streams are of different orders. Therefore, when a third-order stream and a fourth-order stream meet, the combined segment remains a fourth-order stream. The order only increases when two streams of the exact same order join, ensuring a consistent and hierarchical classification of complexity within a river network system.

227. (A) 0.785
The form factor is a quantitative measure of basin shape, calculated as the ratio of the basin's area to the square of its axial length. For an almost perfectly circular drainage basin, this value is approximately 0.785. A form factor close to this theoretical maximum indicates a compact shape, which typically results in more rapid and concentrated flood peaks because all parts of the basin contribute runoff to the outlet at roughly the same time.

228. (C) A profile is a two-dimensional representation of a statistical relationship.
In geomorphology, a profile is specifically a graphical representation showing the cross-section of the Earth's surface elevation along a specific line, not a general statistical relationship. While clinographic curves relate slope to area and hypsographic curves relate elevation to area, profiles show actual physical landforms. Altimetric frequency graphs correctly serve as histograms for elevation data. Therefore, the statement incorrectly defines a profile's function, which is to visualize physical terrain variation along a path.

229. (D) Performing an overlay of a soil map and a land use map.
Performing an overlay of different map layers is a core analysis function in a geographic information system. This process combines spatial data from multiple sources to identify relationships, such

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278. (B) The majority of students scored very close to the average score.
A low standard deviation indicates that the individual data points in a set are clustered closely around the arithmetic mean. In the context of student test scores, this suggests that most students performed similarly, with very few scoring much higher or lower than the average score. It reflects a high degree of uniformity and low variability within the group's performance.

279. (C) Measures of Inequalities
Measures of inequalities are statistical tools used to quantify the uneven distribution of resources or services across a population or geographic area. When a study highlights that a few districts have many facilities while others have few, it is describing a spatial imbalance. These measures help researchers understand disparities in access and support the development of policies for distribution.

280. (D) Set A and Set B have the same mean, but Set B has a higher dispersion.
Both datasets have the same arithmetic mean of twenty-five. However, Set A has values that are very close to each other, while Set B has values that range from fifteen to thirty-five. This means that Set B has a much higher degree of dispersion, representing greater variability. Statistical analysis reveals that while the averages are identical, the spread differs significantly.

281. (A) t-test
The t-test is a statistical method specifically designed to compare the means of two distinct groups to determine if the observed difference is statistically significant. When a researcher compares average incomes between two urban neighbourhoods, the t-test evaluates whether the variation between the groups is greater than what would be expected by chance. This makes it the appropriate choice here.

282. (B) draw statistically valid inferences about a population from a subset.
Sampling is the process of selecting a smaller, representative subset of individuals or items from a larger population. The primary goal is to use the data collected from this sample to draw statistically valid conclusions or inferences about the entire population. This approach is necessary when studying the whole population is impractical due to constraints on time, budget, or logistics.

283. (B) Chi-square test
The chi-square test is a statistical tool used to compare observed frequencies in categorical data with the frequencies that would be expected under a specific hypothesis. In this scenario, a geographer uses it to determine if the actual count of tree species matches a theoretical distribution. This test is ideal for evaluating goodness-of-fit and independence in non-continuous, categorical datasets.

284. (A) When comparing the means of three or more groups.
Analysis of Variance, or ANOVA, is the appropriate statistical method for comparing the means of three or more groups simultaneously. While a t-test is limited to comparing exactly two groups, ANOVA evaluates whether at least one group mean significantly differs from the others. Using multiple t-tests for more than two groups increases the risk of error, making ANOVA robust.

285. (C) It is a statement of no effect or no difference that the test aims to challenge.
In statistical hypothesis testing, the null hypothesis is a formal statement asserting that there is no significant effect, difference, or relationship between the variables being studied. It serves as a baseline for the test. The objective of the researcher is to determine if the collected data provides sufficient evidence to reject this statement in favour of an alternative research finding.

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286. (D) Correlation only measures the strength of a relationship, while regression models it for prediction.
Correlation analysis measures the strength and direction of a linear relationship between two continuous variables without implying causation. In contrast, regression analysis attempts to model that relationship mathematically. This modelling allows researchers to predict the value of a dependent variable based on the values of one or more independent variables. While correlation describes an association, regression provides a tool for prediction.

287. (C) A strong negative relationship where temperature tends to decrease as elevation increases.
A correlation coefficient of -0.85 indicates a strong negative linear relationship between two variables. In this context, as elevation increases, the average annual temperature tends to decrease significantly. The negative sign represents the inverse direction of the relationship, while the magnitude of 0.85, being close to 1, reflects a high degree of consistency in how these two variables interact.

288. (B) To prevent indicators with larger units or ranges from disproportionately influencing the final score.
Indicators used in geographic indices are often measured in different units and ranges, such as percentages versus large currency values. Making indicators scale-free through standardization or normalization is essential before aggregation. This step ensures that variables with naturally larger numeric ranges do not disproportionately influence or dominate the final composite index score, allowing for a balanced and fair comparison of data.

289. (D) computing a composite index.
Computing a composite index involves combining multiple standardized indicators into a single summary score. In this example, rainfall deviation, groundwater levels, and crop failure rates are aggregated to represent the complex phenomenon of drought vulnerability. This approach simplifies multi-dimensional spatial data, making it easier for policymakers and geographers to compare different districts and identify areas that require prioritized assistance.

290. (A) Regression analysis
Regression analysis is a statistical technique used to model the relationship between a dependent variable and one or more independent variables. By developing a model that predicts crop yield based on rainfall and fertilizer use, a geographer can quantify how changes in those inputs affect production. This method is fundamental for understanding cause-and-effect relationships and for forecasting outcomes.

291. (C) To reduce the number of variables in a dataset while retaining maximum information.
The primary goal of Principal Component Analysis is data reduction. It transforms a large set of correlated variables into a smaller number of uncorrelated variables called principal components. This process allows researchers to simplify complex datasets while preserving as much of the original information and variance as possible. It is particularly useful for visualizing high-dimensional data and identifying patterns.

292. (A) Cluster Analysis
Cluster Analysis is a statistical method used for classification by grouping objects that share similar characteristics. In urban geography, a researcher can use this technique to categorize neighbourhoods into lifestyle segments based on diverse attributes like income, age, and spending habits. The resulting clusters ensure that neighbourhoods within a group are more similar to each other than other groups.

293. (D) In decreasing order of the amount of variance they explain.
In Principal Component Analysis, the resulting principal components are ordered based on the amount of variance they explain from the original dataset. The first principal component always accounts for the largest possible proportion of the total variance. Each subsequent component explains the next largest amount of remaining variance, while being uncorrelated with the previous ones. This hierarchy helps researchers prioritize components.

294. (B) Identifying distinct agricultural regions within a country based on soil type, crop type, and irrigation methods.
Identifying distinct agricultural regions by grouping areas with similar soil types, crops, and irrigation methods is a classic application of Cluster Analysis. This technique allows geographers to reveal inherent groupings within spatial data without needing predefined categories. By clustering similar geographical units, researchers can delineate regions that share common environmental and economic traits, facilitating more targeted regional planning and management.

295. (C) creates a new set of uncorrelated components, removing redundancy.

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The main advantage of using Principal Component Analysis on highly correlated variables is its ability to remove data redundancy. It creates a new set of variables that are completely uncorrelated with one another. This simplification makes the dataset more manageable and often reveals underlying structures that were hidden by the overlap in the original information, leading to more efficient analysis.

296. (D) Drainage Density
Drainage Density is a fundamental morphometric measure calculated by dividing the total length of all stream segments in a drainage basin by the basin's total area. This ratio provides significant insight into the landscape's hydrological characteristics and erosional history. A high value typically indicates that the surface is relatively impermeable, leading to more efficient drainage and more surface runoff.

297. (A) branching pattern of the stream network.
The Bifurcation Ratio is a key index in morphometric analysis that relates the number of streams of one order to the number of streams of the next higher order. It provides quantitative information about the branching pattern and structural complexity of a river network. Variations in this ratio can indicate the influence of geological structures, soil types, and climate.

298. (B) Hypsographic Curve
A Hypsographic Curve is a specialized graph used in geomorphology to represent the distribution of a basin's area across different elevations. By plotting the cumulative percentage of area against elevation, the curve provides a visual summary of the basin's topography. This tool is essential for understanding the stage of landscape evolution and comparing the vertical characteristics of various drainage basins.

299. (B) impermeable surfaces and high surface runoff.
High drainage density in a watershed suggests that the surface materials are relatively impermeable, preventing water from infiltrating the ground. As a result, the landscape develops a dense network of stream channels to transport high volumes of surface runoff efficiently. This characteristic is often associated with regions of high rainfall intensity, steep slopes, or sparse vegetation, promoting rapid channelization.

300. (A) Basin Circularity Ratio and Form Factor
The Basin Circularity Ratio and the Form Factor are two specific morphometric indices designed to quantify the overall shape of a drainage basin. The circularity ratio compares the basin's shape to that of a perfect circle, while the form factor relates the basin's area to its squared length. Together, these measures help geomorphologists categorize basins as being circular or elongated.

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34. Arrange the following physiographic units of India from North to South.
(i) Malwa Plateau
(ii) Shiwalik Range
(iii) Deccan Traps
(iv) Terai region
Choose the correct sequence:
(A) (ii), (iv), (i), (iii)
(B) (iv), (ii), (i), (iii)
(C) (ii), (i), (iv), (iii)
(D) (i), (ii), (iii), (iv)

35. The concept of 'Agro-Climatic Zones' in India was introduced for the purpose of:
(A) Demarcating states based on political boundaries.
(B) Classifying regions based on mineral wealth.
(C) Developing region-specific agricultural planning and strategies.
(D) Identifying areas for industrial development.

36. Consider the following statements about the composition of India's external trade:
(a) The share of agricultural products in total exports has been increasing since 2000.
(b) Petroleum, oil, and lubricants (POL) constitute a major portion of India's import bill.
(c) Engineering goods and gems & jewellery are significant items in India's export basket.
(d) The European Union and North America are major trading partners.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c) only
(B) (b), (c), and (d) only
(C) (a), (c), and (d) only
(D) (a), (b), and (d) only

37. Read the following statements and choose the correct option.
Statement I : Black soils are ideal for the cultivation of cotton.
Statement II : Black soils have a high water retention capacity and are rich in lime and iron.
(A) Both statements are true, and Statement II explains Statement I.
(B) Both statements are true, but Statement II is not the explanation.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

38. The headquarters of the Indian Railways is divided into several zones. The policy decisions and overall management fall under which central body?
(A) The Ministry of Road Transport and Highways
(B) The Railway Board
(C) The NITI Aayog
(D) The Zonal Railway Managers Committee

39. The most significant demographic characteristic of the Indian population profile is:
(A) A rapidly aging population.
(B) A sex ratio that is highly favorable to females.
(C) A very low population density.
(D) A high proportion of the population in the young age group (youth bulge).

40. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The western coast of India receives more rainfall than the eastern coast from the Southwest Monsoon.
Reason (R) : The Western Ghats act as a barrier to the moisture-laden winds from the Arabian Sea, causing heavy orographic rainfall.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

41. Which of the following is a marine resource with significant potential along the Indian coastline?
(A) Bauxite
(B) Lignite coal
(C) Polymetallic nodules
(D) Mica

42. The main objective of 'Regional Development Planning' in India is to:
(A) Reduce regional disparities and ensure balanced socio-economic development.
(B) Promote uniform development across all regions of the country.
(C) Focus development efforts primarily on metropolitan cities.
(D) Encourage large-scale migration from rural to urban areas.

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(D) Black Soil (Regur)

8. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The peninsular rivers are generally not navigable for long stretches.
Reason (R) : These rivers are seasonal, with significant fluctuations in water volume, and flow through hard, rocky terrain.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

9. Which of the following is NOT a characteristic of the Shiwalik Range?
(A) It is the outermost range of the Himalayas.
(B) It is composed mainly of unconsolidated sediments.
(C) It is known for the presence of large glaciers and high snow-capped peaks.
(D) Longitudinal valleys known as 'Duns' are found between the Shiwaliks and the Lesser Himalayas.

10. The 'Right to Food' in India is legally backed by which of the following acts?
(A) The National Food Security Act, 2013
(B) The Food Corporation of India Act, 1964
(C) The Essential Commodities Act, 1955
(D) The Consumer Protection Act, 2019

11. Consider the following statements about the determinants of population change in India:
(a) The crude birth rate has been declining steadily since independence.
(b) The crude death rate has declined faster than the crude birth rate.
(c) International migration has a significant impact on the overall population growth of India.
(d) Internal migration affects the spatial pattern of population distribution within the country.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (d) only
(B) (a) and (c) only
(C) (b) and (d) only
(D) (a), (b), (c), and (d)

12. The term 'Himalayan Cryosphere' refers to which of the following components of the Himalayan region?
(A) The unique flora and fauna species localized in the Himalayan region.
(B) Portions of the Earth's surface where water exists in solid form.
(C) The underlying tectonic plates and structural features of the range.
(D) The prevailing atmospheric conditions and high-altitude weather patterns.

13. Which of the following transport networks in India has the highest share in carrying freight traffic in terms of tonne-kilometres?
(A) Roadways
(B) Waterways
(C) Railways
(D) Airways

14. Arrange the following events related to Indian economic and industrial policy in chronological order.
(i) Launch of the First Five-Year Plan
(ii) New Industrial Policy and economic liberalization
(iii) Industrial Policy Resolution establishing a socialistic pattern of society
(iv) Establishment of the Planning Commission
Choose the correct sequence:
(A) (iv), (i), (iii), (ii)
(B) (i), (iv), (ii), (iii)
(C) (iv), (iii), (i), (ii)
(D) (iii), (i), (iv), (ii)

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15. One of the major impacts of globalisation on the Indian economy has been:
(A) A substantial increase in Foreign Direct Investment (FDI) inflows.
(B) A significant decrease in the volume of external trade.
(C) Increased isolation from global economic trends.
(D) Strengthening of the public sector at the expense of the private sector.

16. Which of the following correctly describes 'Bhangar' in the context of the Great Northern Plains of India?
(A) A narrow belt of gravel and pebbles along the foothills of the Shiwaliks.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

52. The primary determinant of population distribution in India is:
(A) Political and administrative boundaries.
(B) The location of major industrial centers.
(C) The historical patterns of migration alone.
(D) The availability of natural resources like water and fertile land.

53. Consider the following statements regarding the Himalayan river systems:
(a) Many Himalayan rivers are older than the mountains themselves, exhibiting antecedent drainage.
(b) They flow through deep gorges carved out by erosional activity.
(c) Their catchment areas are relatively small compared to peninsular rivers.
(d) They are prone to frequent changes in their courses.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (d)
(B) (a), (c), and (d)
(C) (b) and (c) only
(D) (a) and (b) only

54. The 'retreating monsoon' or post-monsoon season in India is characterized by:
(A) Heavy rainfall across the entire country.
(B) Clear skies and a rise in temperature in North India, known as 'October heat'.
(C) The prevalence of southwesterly winds.
(D) The formation of western disturbances.

55. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The ethnic composition of India is highly diverse.
Reason (R) : India has been a destination for various streams of migrants from different parts of Asia and the world over historical periods.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

56. Which of the following represents an institutional factor affecting Indian agriculture?
(A) Land tenure system
(B) Amount of rainfall
(C) Quality of soil
(D) Use of high-yielding variety seeds

57. The Visakhapatnam-Guntur belt is a significant industrial region in India known for:
(A) Jute and tea processing.
(B) Heavy concentration of cotton textile mills.
(C) Agro-based industries and mineral-based industries like steel and shipbuilding.
(D) Automobile and information technology industries.

58. Which of the following is a direct impact of globalisation on Indian agriculture?
(A) Increased exposure of Indian farmers to international competition.
(B) Complete insulation from global price fluctuations.
(C) A shift away from the cultivation of cash crops.
(D) Reduction in the use of technology in farming.

59. Match List I with List II and select the correct option using the codes given below.
List I: (Type of Vegetation)
P. Tropical Evergreen
Q. Tropical Deciduous
R. Tropical Thorn
S. Mangrove
List II: (Dominant Tree Species)
1. Teak, Sal
2. Kikar, Babool
3. Sundari
4. Rosewood, Ebony
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-1, S-2
(C) P-4, Q-1, R-2, S-3
(D) P-1, Q-4, R-2, S-3

60. The Tsunami of 2004 had a devastating impact on which part of India?
(A) The Rann of Kutch
(B) The Andaman and Nicobar Islands and the Coromandel Coast
(C) The Brahmaputra Valley

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(A) Narmada
(B) Mahanadi
(C) Godavari
(D) Krishna

25. The Sub-Tropical Westerly Jet Stream, prevalent over India during the winter season, is responsible for:
(A) Triggering the onset of the southwest monsoon.
(B) Causing heavy rainfall along the Coromandel coast.
(C) Guiding the path of western disturbances into India.
(D) The formation of tropical cyclones in the Bay of Bengal.

26. Which of the following pairs of a crop and its major production region in India is INCORRECTLY matched?
(A) Rubber - Punjab and Haryana
(B) Tea - Assam and West Bengal hills
(C) Jute - West Bengal and Bihar
(D) Saffron - Jammu and Kashmir

27. Match List I with List II and select the correct option using the codes given below.
List I: (Natural Disaster)
P. Earthquake
Q. Drought
R. Flood
S. Cyclone
List II: (Highly Prone Region)
1. Ganga-Brahmaputra Plains
2. Eastern Coastal Plains
3. Himalayan Region
4. Rajasthan and Rayalaseema
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-1, S-3

28. In the context of the occupational structure of India's population, the 'primary sector' includes which of the following activities?
(A) Manufacturing and construction
(B) Agriculture, forestry, and fishing
(C) Trade, transport, and services
(D) Information technology and banking

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29. A key institutional factor that has negatively affected Indian agriculture is:
(A) The provision of agricultural credit through banks.
(B) The establishment of regulated markets (APMCs).
(C) Fragmented and small land holdings.
(D) The implementation of the crop insurance scheme.

30. The term 'break' in the monsoon refers to:
(A) The sudden and violent onset of the monsoon.
(B) The final withdrawal of the monsoon from the country.
(C) The division of the monsoon into two branches.
(D) A dry spell of several days during the rainy season.

31. Which of the following is NOT a major physiographic division of India?
(A) The Central Highlands
(B) The Northern Mountains
(C) The Peninsular Plateau
(D) The Great Indian Desert

32. What is the primary reason for the formation of a delta by the River Ganga, while the River Narmada forms an estuary?
(A) Ganga flows along a significantly shorter and steeper route than the Narmada.
(B) Ganga carries a heavy sediment load, while Narmada flows through a rift valley.
(C) Narmada carries a much larger volume of seasonal water compared to the Ganga.
(D) Narmada is a perennial river system, whereas the Ganga is primarily seasonal.

33. Which of the following statements about the Indian Monsoon is correct?
(A) The onset of the monsoon over the Kerala coast typically occurs in the first week of July.
(B) The Bay of Bengal branch is responsible for rainfall in the Ganga plains.
(C) The Tropical Easterly Jet Stream is associated with the withdrawal phase of the monsoon.
(D) El Niño events are generally associated with a stronger and wetter Indian monsoon.

CHAPTER 10
Geography of India

1. Which of the following is a major characteristic of the Himalayan drainage system?
(A) The rivers are primarily rain-fed and seasonal in nature.
(B) The rivers are perennial, being fed by both glaciers and rainfall.
(C) The rivers form deltas but not estuaries.
(D) The rivers have a shorter and less defined course compared to Peninsular rivers.

2. Read the following statements and choose the correct option.
Statement I : The Indian Monsoon is characterized by a complete reversal of the wind system.
Statement II : The Himalayan mountain range plays a crucial role in preventing cold polar air masses from entering the Indian subcontinent.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

3. Which of the following is an INCORRECT statement regarding the population composition of India?
(A) The rural-urban composition shows a steady increase in the urban population percentage.
(B) The occupational structure is dominated by the primary sector, although its share is declining.
(C) The sex ratio has consistently been favorable to females since independence.
(D) India has a diverse ethnic and religious composition.

4. The 'Green Revolution' in India primarily led to a significant increase in the productivity of which of the following crops?
(A) Pulses and Oilseeds
(B) Jute and Cotton
(C) Sugarcane and Tea
(D) Wheat and Rice

5. Match List I with List II and select the correct option using the codes given below.
List I: (Industrial Region)
P. Mumbai-Pune Region
Q. Hooghly Region
R. Chota Nagpur Plateau Region
S. Bengaluru-Tamil Nadu Region
List II: (Key Characteristic)
1. Centred around jute manufacturing and engineering.
2. Known for heavy metallurgical industries.
3. Dominated by cotton textiles and petrochemicals.
4. Leader in information technology and electronics.
Codes:
(A) P-3, Q-1, R-2, S-4
(B) P-1, Q-3, R-4, S-2
(C) P-3, Q-2, R-1, S-4
(D) P-4, Q-1, R-2, S-3

6. What is the primary cause of winter rainfall in the northwestern part of India, particularly in Punjab and Haryana?
(A) Retreating Monsoon winds withdrawing from North India.
(B) Western Disturbances from the Mediterranean Sea.
(C) Tropical Cyclones originating within the Bay of Bengal.
(D) Orographic rainfall occurring over the Aravalli range.

7. A farmer in the Malwa plateau region primarily grows cotton and soybean. The soil in his farm is deep and clayey, with high water retention capacity, and it develops deep cracks during the dry season. Which soil type is being described?
(A) Alluvial Soil
(B) Laterite Soil
(C) Red and Yellow Soil

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43. Match List I with List II and select the correct option using the codes given below.
List I: (Tributary River)
P. Chambal
Q. Tungabhadra
R. Manas
S. Son
List II: (Main River)
1. Brahmaputra
2. Ganga
3. Krishna
4. Yamuna
Codes:
(A) P-2, Q-1, R-4, S-3
(B) P-4, Q-3, R-1, S-2
(C) P-4, Q-1, R-3, S-2
(D) P-2, Q-3, R-1, S-4

44. Which of the following is NOT considered a Himalayan Highland Hazard?
(A) Landslides
(B) Tsunami
(C) Glacial Lake Outburst Floods (GLOFs)
(D) Snow Avalanches

45. The spatial pattern of population distribution in India is highly uneven. Which of the following is the most densely populated state in India as per the 2011 census?
(A) West Bengal
(B) Kerala
(C) Bihar
(D) Uttar Pradesh

46. Consider the following characteristics of Peninsular India's physiography:
(a) It is one of the oldest and most stable landmasses of the Indian subcontinent.
(b) It is primarily composed of ancient crystalline, igneous, and metamorphic rocks.
(c) It contains several active volcanoes.
(d) The region is frequently affected by high-intensity earthquakes.
(e) It is marked by broad, shallow valleys and rounded hills.
Which of the above statement(s) is/are correct?
(A) (a), (c), and (e) only
(B) (b), (d), and (e) only
(C) (a), (b), and (e) only
(D) (a), (b), (c), and (d) only

47. The term 'Food Security' in the Indian context implies:
(A) Availability, accessibility, and affordability of food to all people.
(B) Availability of sufficient national food production in the country.
(C) The right of every individual citizen to grow their own food.
(D) The physical security of various food grains stored in FCI godowns.

48. The direction of the southwest monsoon winds over the Indian subcontinent is primarily a result of:
(A) The influence of the local mountain systems only.
(B) The Coriolis force deflecting the southeast trade winds after they cross the equator.
(C) The gravitational pull of the moon.
(D) The northward drift of the Indian plate.

49. Laterite soils, found in parts of the Western Ghats and Odisha, are characterized by:
(A) High fertility and suitability for growing wheat.
(B) Intense leaching due to heavy rainfall, leaving behind iron and aluminum oxides.
(C) Being rich in humus and organic matter.
(D) Their formation from the deposition of riverine silt.

50. Consider the following Indian states:
(i) Gujarat
(ii) Andhra Pradesh
(iii) West Bengal
(iv) Kerala
Arrange these states in descending order of the length of their coastline.
(A) (i), (ii), (iii), (iv)
(B) (ii), (i), (iv), (iii)
(C) (i), (ii), (iv), (iii)
(D) (ii), (i), (iii), (iv)

51. Read the following statements and choose the correct option.
Statement I : The Golden Quadrilateral is a highway network connecting the major metropolitan cities of India.
Statement II : The project aims to reduce the time and cost of movement of people and goods between these cities.

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(B) The older alluvium, forming terraces above the floodplains.
(C) A marshy and swampy tract south of the Bhabar belt.
(D) The newer alluvium deposited by rivers in their floodplains.

17. Consider the following statements regarding the Industrial Policies of India:
(a) The Industrial Policy Resolution of 1956 emphasized the role of the public sector.
(b) The Industrial Policy of 1991 abolished industrial licensing for most industries.
(c) The 1991 policy significantly liberalized the regime for foreign investment.
(d) The Monopolies and Restrictive Trade Practices (MRTP) Act was strengthened by the 1991 policy.
Which of the above statements are correct?
(A) (a), (b), and (c)
(B) (b), (c), and (d)
(C) (a), (c), and (d)
(D) (a), (b), and (d)

18. Read the following statements and choose the correct option.
Statement I : The Eastern Coastal Plains are wider and more emergent compared to the Western Coastal Plains.
Statement II : The rivers flowing through the Eastern Coastal Plains form large deltas.
(A) Both Statement I and Statement II are true, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are true, but Statement II is not the correct explanation of Statement I.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

19. Which of the following mineral resources is largely concentrated in the Chota Nagpur Plateau region of India?
(A) Petroleum and Natural Gas
(B) Gold and Diamonds
(C) Coal, Iron ore, and Mica
(D) Gypsum and Salt

20. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The intensity and frequency of floods have increased in many parts of India.
Reason (R) : Deforestation in the catchment areas of rivers and unplanned urbanization are major contributing factors.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

21. The most appropriate definition of 'Productivity' in agriculture is:
(A) Total production of a crop from a country.
(B) Total monetary value of all agricultural produce.
(C) Output per unit of land area (e.g., tonnes per hectare).
(D) The amount of crop harvested per unit of labor.

22. The National Population Policy of India, 2000, aimed to achieve a stable population by which year?
(A) 2025
(B) 2045
(C) 2035
(D) 2050

23. Consider the following natural vegetation types of India:
(a) Tropical Evergreen Forests are found in areas with more than 200 cm of annual rainfall.
(b) Tropical Thorn Forests are characteristic of regions with less than 70 cm of annual rainfall.
(c) Montane Forests exhibit a succession of vegetation zones from tropical to tundra.
(d) Mangrove Forests are dominated by coniferous trees.
(e) Tropical Deciduous Forests are the most widespread forests in India.
Which of the above statement(s) is/are correct?
(A) (a), (b), (c), and (e) only
(B) (b), (c), (d), and (e) only
(C) (a), (b), (d), and (e) only
(D) (a), (c), and (e) only

24. Which of the following is a west-flowing peninsular river?

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(D) The Himalayan foothills

61. Which of the following best describes the rural-urban composition of the Indian population?
(A) The majority of the population is urban, and the trend is accelerating.
(B) The population is almost equally divided between rural and urban areas.
(C) The majority is rural, but the urban population grows at a faster rate.
(D) The urban population has been declining steadily in recent decades.

62. The 'Deccan Traps' physiographic region is predominantly characterized by which type of rock?
(A) Sandstone and Limestone
(B) Granite and Gneiss
(C) Alluvial deposits
(D) Basaltic rocks of volcanic origin

63. Which one of the following is NOT a major food crop in India?
(A) Rubber
(B) Rice
(C) Wheat
(D) Millets

64. Consider the following factors related to Indian Agriculture:
(a) Introduction of High Yielding Variety (HYV) seeds
(b) Expansion of irrigation facilities
(c) Consolidation of land holdings
(d) Increased use of chemical fertilizers and pesticides
(e) Provision of agricultural credit at subsidized rates
Which of the above are considered technological factors?
(A) (a), (b), and (d) only
(B) (c) and (e) only
(C) (a), (c), and (e) only
(D) (a), (b), (c), (d), and (e)

65. The most flood-prone state in India, often referred to as the 'Sorrow of Bihar', is due to the river:
(A) Ganga
(B) Kosi
(C) Gandak
(D) Son

66. Read the following statements and choose the correct option.
Statement I : The educational composition of the Indian population shows significant disparities between males and females.
Statement II : Government policies like 'Beti Bachao, Beti Padhao' aim to address the gender gap in education.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

67. Which of the following is the main direction of India's internal trade flow?
(A) From agricultural surplus states to industrially developed states.
(B) From mineral-rich eastern states to other parts of the country.
(C) All of the above, reflecting a complex web of exchanges.
(D) From coastal regions to the hinterland.

68. The largest river basin in Peninsular India belongs to which river?
(A) Mahanadi
(B) Krishna
(C) Kaveri
(D) Godavari

69. Arrange the following stages of the Indian Monsoon in the correct chronological order of their occurrence in a typical year.
(i) Onset over Kerala
(ii) Withdrawal from Northwestern India
(iii) Covering the entire country
(iv) Retreat from the Peninsular tip
Choose the correct sequence:
(A) (i), (ii), (iii), (iv)
(B) (i), (iii), (ii), (iv)
(C) (ii), (i), (iv), (iii)
(D) (iii), i, (ii), (iv)

70. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : Regional development planning in India has not been fully successful in eliminating regional disparities.
Reason (R) : The implementation of regional

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population.
(D) The proportion of rural and urban population.

109. Which of the following correctly identifies a major iron ore belt in India?
(A) The Kollam-Thiruvananthapuram belt in Kerala.
(B) The Mumbai-Pune belt in Maharashtra.
(C) The Durg-Bastar-Chandrapur belt in Chhattisgarh.
(D) The Gangetic delta belt in West Bengal.

110. Read the following statements and choose the correct option.
Statement I : The Andaman and Nicobar Islands are of volcanic origin and are peaks of a submerged mountain range.
Statement II : The Lakshadweep Islands are of coral origin.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

111. The rain-shadow effect of the Western Ghats is responsible for low rainfall in which of the following regions?
(A) The interior Deccan Plateau in Maharashtra and Karnataka
(B) The Konkan coast
(C) The Malabar coast
(D) The Brahmaputra valley

112. Arrange the following states in descending order based on their population size as per the 2011 Census.
(i) Uttar Pradesh
(ii) Maharashtra
(iii) Bihar
(iv) West Bengal
Choose the correct sequence:
(A) (i), (ii), (iii), (iv)
(B) (i), (iii), (ii), (iv)
(C) (i), (ii), (iv), (iii)
(D) (ii), (i), (iii), (iv)

113. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The Green Revolution in India led to a widening gap between rich and poor farmers.
Reason (R) : The new technology and inputs were expensive, and only the large and resourceful farmers could afford them in the initial stages.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

114. The Gujarat industrial region is well-known for which of the following industrial clusters?
(A) Petrochemicals, textiles, and pharmaceuticals
(B) Jute and paper industries
(C) Heavy engineering and metallurgical industries
(D) Tea processing and silk weaving

115. A natural disaster is declared when an event causes:
(A) A minor change in the physical environment.
(B) Any naturally occurring phenomenon.
(C) Widespread losses exceeding community coping capacity.
(D) A predictable seasonal change like winter.

116. Match List I with List II and select the correct option using the codes given below.
List I: (Term)
P. Yield
Q. Production
R. Productivity
S. Cropping Intensity
List II: (Definition)
1. Total output of a commodity
2. Output per unit of a factor of production (e.g., land)
3. Ratio of Gross Cropped Area to Net Sown Area
4. Output per unit of land for a specific crop
Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-4, S-3

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of Khambhat.

80. Himalayan Highland Hazards are often aggravated by:
(A) Large-scale afforestation projects within the high mountain regions.
(B) Anthropogenic activities like road construction and deforestation.
(C) The traditional practice of terrace farming by local communities.
(D) Very low population density currently observed across the region.

81. Which of the following is NOT a determinant of population composition?
(A) Age and Sex
(B) National GDP
(C) Rural-Urban structure
(D) Occupational structure

82. The highest peak in the Peninsular Plateau of India is:
(A) Anai Mudi
(B) Doddabetta
(C) Mahendragiri
(D) Kalsubai

83. Consider the following statements regarding the impact of the Green Revolution in India:
(a) It made India self-sufficient in food grain production.
(b) It led to increased inter-regional and intra-regional disparities.
(c) It primarily benefited wheat-growing regions.
(d) It caused environmental problems like soil degradation and water depletion.
(e) It ensured equitable benefits for both large and small farmers.
Which of the above statement(s) is/are correct?
(A) (a), (b), (c), and (d) only
(B) (b), (c), (d), and (e) only
(C) (a), (c), and (e) only
(D) All are correct

84. Read the following statements and choose the correct option.
Statement I : India has a very long coastline which is advantageous for external trade.
Statement II : However, the coastline is relatively smooth and has few natural harbours, especially on the east coast.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

85. Which climatic division of India is characterized by hot, dry summers and cool, dry winters with scanty and unreliable rainfall?
(A) Tropical Monsoon Climate (Amw)
(B) Tropical Savanna Climate (Aw)
(C) Arid or Desert Climate (BWhw)
(D) Humid Subtropical with Dry Winter (Cwg)

86. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : Cyclones are a recurrent hazard along India's eastern coast.
Reason (R) : The Bay of Bengal is a region of high sea surface temperatures and is a known area for the formation of tropical depressions.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

87. Which of the following is a key feature of the industrial development pattern in India since independence?
(A) A consistent decline in the contribution of the industrial sector to GDP.
(B) The dominant and ever-increasing role of the public sector since 1991.
(C) The concentration of all industries in only two major cities.
(D) A diversification of the industrial base from traditional to modern industries.

88. The most widespread and productive soil type in India is:
(A) Alluvial Soil
(B) Black Soil
(C) Red Soil
(D) Laterite Soil

89. The 'sex ratio' in the context of population composition is defined as:
(A) The number of children born per 1000 population.

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(B) The number of males per 1000 females.
(C) The number of females per 1000 males.
(D) The difference between birth rate and death rate.

90. Arrange the following mountain ranges of the Himalayas from north to south.
(i) Pir Panjal Range
(ii) Karakoram Range
(iii) Shiwalik Range
(iv) Zaskar Range
Choose the correct sequence:
(A) (ii), (iv), (i), (iii)
(B) (iv), (ii), (i), (iii)
(C) (ii), (i), (iv), (iii)
(D) (i), (ii), (iii), (iv)

91. Which one of the following factors has NOT been a major driver of globalisation's impact on the Indian economy?
(A) Advancements in information and communication technology.
(B) Liberalisation of trade and investment policies.
(C) The growth of multinational corporations.
(D) The dominant role of the agricultural sector in exports.

92. The 'Khadar' soils of the Northern Plains are:
(A) Older alluvium found on higher terraces.
(B) New, fertile alluvium deposited annually in floodplains.
(C) Saline and alkaline soils unfit for cultivation.
(D) Coarse, pebbly soils found at the foothills.

93. Consider the following statements about National Waterways in India:
(a) NW-1 is on the Ganga river between Allahabad and Haldia.
(b) NW-2 is on the Brahmaputra river between Sadiya and Dhubri.
(c) Inland waterways are a highly developed and dominant mode of transport in India.
(d) They are considered an energy-efficient and environment-friendly mode of transport.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c)
(B) (b), (c), and (d)
(C) (a), (b), and (d)
(D) (a), (c), and (d)

94. The religious composition of India's population is dominated by which group, according to Census 2011?
(A) Muslims
(B) Christians
(C) Sikhs
(D) Hindus

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95. Match List I with List II and select the correct option using the codes given below.
List I: (Natural Resource)
P. Iron Ore
Q. Petroleum
R. Bauxite
S. Water (Perennial Rivers)
List II: (Major Area of Occurrence in India)
1. Amarkantak Plateau
2. Mumbai High offshore field
3. Odisha-Jharkhand Belt
4. Himalayan Region
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-2, R-1, S-4
(C) P-3, Q-1, R-2, S-4
(D) P-2, Q-3, R-4, S-1

96. A major environmental concern associated with the Green Revolution is:
(A) Increased biodiversity across rural lands.
(B) Soil salinization and waterlogging from irrigation.
(C) Significant reduction in overall air pollution.
(D) Improvement in the regional groundwater table.

97. Which of the following is the best example of a 'footloose industry'?
(A) Iron and Steel Plant
(B) Software and IT industry
(C) Sugar Mill
(D) Cement Plant

98. Read the following statements and choose the correct option.
Statement I : Drought is a slow-onset disaster.
Statement II : Drought is characterized by a prolonged period of abnormally low rainfall, leading to a shortage of water.
(A) Both Statement I and Statement II are true, and Statement II is a direct cause of Statement I.

(B) Both Statement I and Statement II are true, but are independent statements.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

99. The "age-sex pyramid" of India is characterized by:
(A) A narrow base and a broad top, indicating an aging population.
(B) A rectangular shape, indicating a stable population.
(C) A broad base and a tapering top, indicating a youthful and growing population.
(D) An inverted pyramid shape, indicating a declining population.

100. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The peninsular drainage system is older than the Himalayan drainage system.
Reason (R) : The Peninsular plateau is a geologically ancient and stable block of land, while the Himalayas are young fold mountains.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

101. Which of the following is an INCORRECT pair of a Himalayan peak and its location?
(A) Kanchenjunga - Sikkim
(B) Nanga Parbat - Jammu and Kashmir
(C) Mount Everest - Himachal Pradesh
(D) Nanda Devi - Uttarakhand

102. The mechanism of the Indian monsoon is influenced by which of the following phenomena:
(a) The differential heating and cooling of land and water.
(b) The shift in the position of the Inter-Tropical Convergence Zone (ITCZ).
(c) The presence of the high-pressure area east of Madagascar.
(d) The Tibetan plateau getting intensely heated during summer.
(e) The movement of the westerly jet stream.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c) only
(B) (c), (d), and (e) only
(C) (a), (b), and (e) only
(D) All (a), (b), (c), (d), and (e) are correct.

103. 'Jhum cultivation', a form of agriculture practiced in parts of Northeast India, is also known as:
(A) Intensive subsistence farming
(B) Commercial farming
(C) Plantation agriculture
(D) Shifting cultivation

104. Which Five-Year Plan in India for the first time explicitly mentioned 'regional balance' as one of its major objectives?
(A) Third Five-Year Plan
(B) First Five-Year Plan
(C) Second Five-Year Plan
(D) Fifth Five-Year Plan

105. The main objective of the National Population Policy (NPP), 2000 was to address:
(A) Only the issue of international migration.
(B) The decline in the working-age population.
(C) Unmet needs for contraception and health care.
(D) Promotion of early marriage for fertility.

106. In India, which type of natural vegetation is characterized by trees shedding their leaves for about six to eight weeks in the dry summer?
(A) Tropical Deciduous Forests
(B) Tropical Evergreen Forests
(C) Montane Forests
(D) Mangrove Forests

107. Which of the following is a major challenge for the development of internal waterways in India?
(A) Lack of perennial rivers.
(B) Absence of a coastline.
(C) High cost of fuel compared to road transport.
(D) Reduced water flow due to diversion for irrigation.

108. The term 'occupational structure' of a population refers to:
(A) The distribution of the population according to different age groups.
(B) The distribution of the working population across different sectors of the economy.
(C) The level of literacy and education in the

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plans often faces challenges related to funding, political will, and administrative coordination.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

71. Which of the following is an example of a pipeline network used for transporting a non-petroleum product in India?
(A) Mumbai High-Koyali pipeline
(B) Salaya-Mathura pipeline
(C) Duliajan-Barauni pipeline
(D) Hazira-Vijaipur-Jagdishpur (HVJ) pipeline

72. The 'Karewas' of Kashmir valley are known for the cultivation of:
(A) Saffron
(B) Rice
(C) Apples
(D) Tea

73. Consider the following statements about the characteristics of Indian agriculture:
(a) High dependency on the monsoon.
(b) Predominance of subsistence farming.
(c) Low productivity compared to developed countries.
(d) Significant disguised unemployment.
Which of the above statement(s) is/are correct?
(A) (a) and (b) only
(B) (c) and (d) only
(C) (a), (b), and (c) only
(D) (a), (b), (c), and (d)

74. The concept of "demographic dividend" in the context of India's population refers to:
(A) Economic growth potential due to more people in the working-age group.
(B) The specific economic benefit resulting from a declining death rate.
(C) Financial incentives provided by the government for family planning.
(D) The rapid rise in the proportion of population living in urban areas.

75. The Industrial Policy Resolution of 1956 classified industries into how many schedules or categories?
(A) Two
(B) Four
(C) Five
(D) Three

76. The seasonal weather characteristic of 'Nor'westers' or 'Kal Baisakhi' is experienced in which part of India?
(A) Punjab and Haryana
(B) West Bengal and Assam
(C) Rajasthan and Gujarat
(D) Kerala and Karnataka

77. Which of the following best describes the trend of India's external trade since the 1991 economic reforms?
(A) A consistent trade surplus.
(B) A decline in both exports and imports.
(C) A significant increase in the volume and value of trade, but with a persistent trade deficit.
(D) A shift in trade partners exclusively towards African nations.

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78. Match List I with List II and select the correct option using the codes given below.
List I: (Soil Type)
P. Alluvial Soil
Q. Black Soil
R. Laterite Soil
S. Red Soil
List II: (Major Characteristic)
1. Formed by intense leaching
2. Rich in potash, poor in phosphorus
3. Deficient in lime, magnesia, phosphates
4. High water retention capacity
Codes:
(A) P-2, Q-4, R-1, S-3
(B) P-4, Q-2, R-3, S-1
(C) P-2, Q-1, R-4, S-3
(D) P-3, Q-4, R-1, S-2

79. The Luni river, which originates in the Pushkar valley of the Aravalli range, is a characteristic feature of which drainage system?
(A) It is an example of an inland drainage system, disappearing into the sands of the Rann of Kutch.
(B) It drains into the Bay of Bengal.
(C) It is a major tributary of the Ganga.
(D) It flows into the Arabian Sea near the Gulf

117. Which of the following is a significant characteristic of the composition of India's imports?
(A) A very small share of crude oil and petroleum products.
(B) A very high share of food grains.
(C) A dominant share of capital goods, raw materials, and petroleum.
(D) A major share of finished consumer goods for direct consumption.

118. The "growth of population" refers to:
(A) The number of births in a particular area.
(B) The increase in the number of inhabitants of a territory during a specific period.
(C) The movement of people from one place to another.
(D) The number of people per unit area.

119. Consider the following statements about the drainage systems of India:
(a) The Godavari is the largest Peninsular river system.
(b) The Indus river originates near Lake Manasarovar in Tibet.
(c) The Narmada and Tapi are major east-flowing rivers.
(d) The Brahmaputra enters India in Arunachal Pradesh under the name Dihang.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (d)
(B) (a), (c), and (d)
(C) (b) and (c) only
(D) (a) and (b) only

120. Which of the following is an example of a water resource available in India?
(A) All of the above
(B) Surface runoff in rivers and lakes
(C) Groundwater in aquifers
(D) Lagoons and backwaters

121. The period of population explosion in India is generally considered to be:
(A) 1901-1921
(B) 1921-1951
(C) 1951-1981
(D) 1981-2011

122. Red soils develop on crystalline igneous rocks in areas of low rainfall in which parts of India?
(A) The eastern and southern parts of the Deccan Plateau
(B) The Northern Plains
(C) The Himalayan region
(D) The Thar Desert

123. The 'Mango Showers' are pre-monsoon showers that are common in which of the following states and help in the ripening of mangoes?
(A) Punjab and Haryana
(B) West Bengal and Assam
(C) Rajasthan and Gujarat
(D) Kerala and Karnataka

124. Which of the following is a major negative consequence of the Green Revolution?
(A) Decrease in food production
(B) Increased regional disparities in development
(C) Reduction in the use of fertilizers
(D) Improvement in rural employment for all

125. Read the following statements and choose the correct option.
Statement I : Globalisation has led to an increased flow of capital and technology into the Indian economy.
Statement II : This has resulted in the growth of new sectors like IT and business process outsourcing (BPO).
(A) Both Statement I and Statement II are true, and Statement II is an effect of Statement I.
(B) Both Statement I and Statement II are true, but are independent statements.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

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126. The highest railway line in India, and one of the highest in the world, passes through which of the following mountain passes?
(A) Zoji La
(B) Nathu La
(C) Bomdi La
(D) The question premise is flawed; railways do not cross the high Himalayas in such a manner.

127. Which of the following is NOT a major mineral resource found in India?
(A) Tin
(B) Iron Ore

in India is often driven by central government initiatives and funding.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

146. Which of the following is an example of a marine resource?
(A) Fish and other seafood
(B) Coal
(C) Iron ore
(D) Bauxite

147. A key technological factor that spurred the Green Revolution was:
(A) Land reforms
(B) The Minimum Support Price (MSP) policy
(C) The development of High Yielding Variety (HYV) seeds
(D) The creation of cooperative societies

148. Which among the following is the westernmost point of the East-West corridor of the National Highways Development Project (NHDP)?
(A) Mumbai
(B) Okha
(C) Surat
(D) Porbandar

149. In terms of religious composition, which religious group constitutes the second largest population in India?
(A) Christians
(B) Sikhs
(C) Muslims
(D) Buddhists

150. Read the following statements and choose the correct option.
Statement I : The peninsular rivers have reached a mature stage and have a graded profile.
Statement II : The hard rock base and lack of siltation mean that these rivers do not frequently change their course.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

151. Which of the following is a major characteristic of the climate of India?
(A) Uniform temperature throughout the year across the country.
(B) The complete absence of a dry season.
(C) Rainfall exclusively from western disturbances.
(D) The rhythm of seasons and the reversal of winds.

152. The production, productivity, and yield of major food crops in India show significant regional variations primarily due to differences in:
(A) Environmental, technological, and institutional factors.
(B) Political leadership.
(C) The number of public holidays.
(D) The linguistic diversity of the states.

153. What was the primary focus of India's industrial development strategy during the Second Five-Year Plan (1956-61)?
(A) Development of agriculture and small-scale industries.
(B) Promotion of the service sector and information technology.
(C) Rapid industrialisation focused on heavy industries and capital goods.
(D) Liberalisation of the economy and encouragement of foreign direct investment.

154. The Mumbai-Pune industrial cluster owes its growth primarily to:
(A) Port development and the availability of hydroelectricity.
(B) Proximity to the coal fields of Jharkhand.
(C) The cultivation of jute in the surrounding region.
(D) The presence of a large number of public sector undertakings established in 1950.

155. Which of the following regions in India is most susceptible to severe droughts?
(A) The Brahmaputra Valley in Assam
(B) The coastal areas of Kerala
(C) The foothills of the Himalayas in Uttarakhand
(D) The KBK region of Odisha and parts of Rajasthan.

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majority of the population.
(C) It includes provisions for nutritional support to pregnant women and children.
(D) It makes the provision of food grains a legal entitlement.

137. The division of the Indian population into 'working' and 'non-working' (or dependent) categories is a part of which population characteristic?
(A) Religious composition
(B) Sex composition
(C) Age composition
(D) Occupational composition

138. Match List I with List II and select the correct option using the codes given below.
List I: (Dam/Project)
P. Bhakra-Nangal
Q. Hirakud
R. Nagarjuna Sagar
S. Sardar Sarovar
List II: (River)
1. Mahanadi
2. Krishna
3. Narmada
4. Satluj
Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-3, S-4

139. Which of the following is a major Himalayan highland hazard triggered by heavy rainfall or earthquakes?
(A) Drought
(B) Heatwave
(C) Tsunami
(D) Landslide

140. A high 'dependency ratio' in a population implies that:
(A) A large proportion of the population is in the working-age group.
(B) Many people are in non-working groups like children and the elderly.
(C) The country is highly dependent on imports.
(D) The economy is highly dependent on a single sector.

141. The economic reforms of 1991 in India led to a policy shift from:
(A) A market-led economy to a state-controlled economy.
(B) An agriculture-based economy to a service-based economy overnight.
(C) A state-controlled economy to a liberalized and market-oriented one.
(D) A liberalized economy to a protectionist economy.

142. The term 'Bhabar' represents a narrow belt about 8 to 16 km in width lying parallel to the slopes of the Shiwaliks. What is its key characteristic?
(A) It is a marshy and swampy region with thick forests.
(B) It is composed of older alluvium, rich in calcareous concretions.
(C) It is composed of fine, fertile newer alluvium.
(D) It is a pebble-studded zone where streams disappear underground.

143. Consider the following statements regarding the Indian Monsoon:
(a) The Arabian Sea branch of the monsoon is stronger than the Bay of Bengal branch.
(b) The Coromandel coast receives substantial rainfall from the retreating monsoon.
(c) The onset of the monsoon is a gradual process that takes several months.
(d) The Thar desert region receives very heavy rainfall from the monsoon.
Which of the above statement(s) is/are correct?
(A) (a) and (b)
(B) (c) and (d)
(C) (a) and (c)
(D) (b) and (d)

144. Which of the following is the most significant determinant of India's climate?
(A) The monsoon winds.
(B) The presence of the oceans on three sides.
(C) The latitudinal extent of the country.
(D) The Himalayan mountain range.

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145. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : India has a federal structure but with a strong centralizing tendency.
Reason (R) : Regional development planning

(C) Coal
(D) Bauxite

128. Consider the following statements regarding the impact of the Green Revolution in India:
(a) It made India self-sufficient in food grain production.
(b) It led to increased inter-regional and intra-regional disparities.
(c) It primarily benefited wheat-growing regions.
(d) It caused environmental problems like soil degradation and water depletion.
(e) It ensured equitable benefits for both large and small farmers.
Which of the above statement(s) is/are correct?
(A) (a), (b), (c), and (d) only
(B) (b), (c), (d), and (e) only
(C) (a), (c), and (e) only
(D) All are correct

129. The "determinants of population" primarily include:
(A) Climate, soil, and vegetation
(B) Fertility, mortality, and migration
(C) Production, distribution, and consumption
(D) Education, health, and housing

130. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : The Hooghly industrial region developed early, centered around the Kolkata port.
Reason (R) : The development was historically facilitated by British colonial policies, availability of coal and iron from the nearby Chota Nagpur plateau, and a large labour force.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

131. Which of the following statements about the Indian railway network is incorrect?
(A) It is one of the largest railway networks in the world.
(B) It was first introduced in India in 1853.
(C) The network is highly dense and uniformly distributed across the country.
(D) It plays a crucial role in long-distance travel and freight movement.

132. The primary objective of an Industrial Policy is to:
(A) Control the prices of all consumer goods.
(B) Regulate agricultural production.
(C) Manage external trade and tariffs exclusively.
(D) Steer the pace and pattern of industrial development in a country.

133. Consider the following statements regarding hazards and disasters in India:
(a) The entire Himalayan region is highly vulnerable to earthquakes.
(b) The Deccan Plateau is considered a seismically stable zone but has experienced major earthquakes like the one in Latur.
(c) Drought is primarily a meteorological phenomenon but its impacts are socio-economic.
(d) Cyclones primarily affect the northern states of India like Punjab and Haryana.
(e) Landslides are a common hazard in the coastal plains of India.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c) only
(B) (c), (d), and (e) only
(C) (a), (b), and (d) only
(D) (a), (c), and (e) only

134. The main cause for the red colour of red soils is:
(A) The high amount of humus content.
(B) The wide diffusion of iron in crystalline and metamorphic rocks.
(C) The presence of kankar nodules.
(D) The high content of magnesium and lime.

135. The concept of 'watershed management' is a key strategy for the conservation of which natural resource?
(A) Mineral resources
(B) Forest resources
(C) Marine resources
(D) Water and Soil resources

136. Which of the following is NOT a feature of the National Food Security Act (NFSA), 2013?
(A) It guarantees the provision of organic food to all citizens.
(B) It provides for subsidized food grains to a

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156. The 'composition of population' is a distinct field of study that focuses on:
(A) The absolute number of people in an area.
(B) The attributes of the population such as age, sex, literacy, and occupation.
(C) The growth rate of the population over time.
(D) The movement of people between regions.

157. Consider the following statements about the physiography of India:
(a) The Himalayas are geologically young and structurally fold mountains.
(b) The Peninsular Plateau is composed of old crystalline, igneous and metamorphic rocks.
(c) The Northern plains are formed by the alluvial deposits brought by the three major river systems.
(d) The Coastal plains are a result of volcanic activity.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c)
(B) (a), (c), and (d)
(C) (b), (c), and (d)
(D) (a), (b), and (d)

158. Indian monsoon is said to have 'arrived' with a sudden onset, often called the:
(A) Break of the monsoon
(B) Retreat of the monsoon
(C) Loo
(D) Burst of the monsoon

159. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : A well-developed transport network is a prerequisite for regional development.
Reason (R) : Transport networks facilitate the movement of goods and people, promoting trade, industrialisation, and socio-economic integration.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

160. Which of the following is NOT a major crop region in India?
(A) The rice-jute-tea region of the east and northeast.
(B) The olive and citrus fruit region spanning the entire country.
(C) The wheat and sugarcane region of the north and northwest.
(D) The cotton and coarse grains region of the west and Deccan.

161. The Himalayan cryosphere is a vital source of water for the perennial rivers of North India. Its depletion due to climate change could lead to:
(A) Increased water security in the long run.
(B) Initial increase in river flow followed by a long-term decrease.
(C) No significant impact on the river systems.
(D) A decrease in the frequency of floods in the plains.

162. In the context of population, "spatial pattern of distribution" refers to:
(A) The way people are spread out over the earth's surface.
(B) The age structure of the population.
(C) The male-female ratio in the population.
(D) The growth of population over a decade.

163. Match List I with List II and select the correct option using the codes given below.
List I: (Term related to population)
P. Rural Composition
Q. Age Composition
R. Sex Composition
S. Occupational Composition
List II: (Description)
1. Number of females per thousand males
2. Percentage of population engaged in primary, secondary, and tertiary activities
3. Percentage of population living in villages
4. Number of people in different age groups
Codes:
(A) P-3, Q-4, R-1, S-2
(B) P-1, Q-2, R-3, S-4
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-1, S-3

164. The primary factor responsible for the creation of the Andaman and Nicobar Islands is:
(A) Coral deposition.
(B) Riverine deposition.
(C) Glacial erosion.
(D) Tectonic activity lifting a submerged

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located in the Himalayan region.
(c) Bauxite is the ore from which aluminium is extracted.
(d) The Kolar Gold Fields are located in Karnataka.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c)
(B) (a), (c), and (d)
(C) (b), (c), and (d)
(D) (a), (b), and (d)

186. The rainfall along the Malabar Coast is a direct result of which of the following?
(A) The Arabian Sea branch of the Southwest Monsoon striking the Western Ghats.
(B) The Bay of Bengal branch of the Southwest Monsoon.
(C) The Western Disturbances.
(D) The Northeast Monsoon.

187. Read the following statements and choose the correct option.
Statement I : Internal trade in India is much larger in volume than its external trade.
Statement II : This is due to the vast size of the domestic market and the diversity of resources and production across different states.
(A) Both Statement I and Statement II are true, and Statement II is the correct explanation of Statement I.
(B) Both Statement I and Statement II are true, but Statement II is not the correct explanation of Statement I.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

188. Which major physiographic division of India is considered to be the most unstable landmass?
(A) The Peninsular Plateau
(B) The Northern Mountains (Himalayas)
(C) The Coastal Plains
(D) The Indian Desert

189. A key institutional factor affecting the productivity of Indian agriculture is:
(A) The quality of seeds used.
(B) The availability of rainfall.
(C) The system of land tenure and size of landholdings.
(D) The type of machinery used.

190. The most vulnerable part of India to tropical cyclones is:
(A) The western coast (Gujarat and Maharashtra).
(B) The northern plains (Punjab and Uttar Pradesh).
(C) The Thar desert region of Rajasthan.
(D) The eastern coast (Odisha, Andhra Pradesh, and West Bengal).

191. The term 'ethnic composition' in the context of a population relates to:
(A) The distribution of people based on their shared ancestry, culture, and language.
(B) The distribution of people by their religious beliefs.
(C) The distribution of people based on their place of residence (rural/urban).
(D) The distribution of people by their literacy levels.

192. Which of the following is a direct consequence of the collision between the Indian and Eurasian tectonic plates?
(A) The formation of the Deccan Traps.
(B) The formation of the Himalayan mountains.
(C) The retreat of the monsoon.
(D) The formation of coral islands.

193. Match List I with List II and select the correct option using the codes given below.
List I: (Hazard)
P. Himalayan Highland Hazard
Q. Tsunami
R. Drought
S. Flood
List II: (Primary Cause/Region)
1. Meteorological - deficiency in rainfall
2. Heavy rainfall in river catchments / dam failure
3. Tectonic instability / steep slopes
4. Undersea earthquake / crustal displacement
Codes:
(A) P-1, Q-2, R-3, S-4
(B) P-3, Q-4, R-1, S-2
(C) P-3, Q-1, R-4, S-2
(D) P-2, Q-4, R-1, S-3

194. Which of the following is NOT an objective of India's population policies?
(A) To encourage a high population growth rate

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175. The term 'jet stream' refers to:
(A) A narrow belt of high-altitude, fast-moving winds in the upper atmosphere.
(B) A fast-flowing water current in the ocean.
(C) The exhaust from a jet engine.
(D) A seasonal surface wind in coastal areas.

176. Which of the following is NOT a major type of soil found in India?
(A) Alluvial Soil
(B) Tundra Soil
(C) Black Soil
(D) Laterite Soil

177. The development pattern of which transport network in India has been heavily influenced by the country's physiography and economic needs?
(A) Airways
(B) Railways
(C) Pipelines
(D) Internet cables

178. What does "composition" in the context of external trade refer to?
(A) The types of goods and services being exported and imported.
(B) The countries with which trade is conducted.
(C) The total value of exports and imports.
(D) The direction of trade routes.

179. Read the following assertion (A) and reason (R) and choose the correct option.
Assertion (A) : Regional planning is essential for a large and diverse country like India.
Reason (R) : It aims to reduce developmental imbalances between regions and ensure that the benefits of growth reach all parts of the country.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

180. The most appropriate measure to mitigate the impact of floods is:
(A) Building more structures in the floodplain.
(B) Deforestation in the river's upper catchment area.
(C) Increasing the discharge of industrial effluents into the river.
(D) Constructing embankments, dams, and warning systems.

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181. The main difference between Himalayan and Peninsular rivers is that:
(A) Himalayan rivers are seasonal, while Peninsular rivers are perennial.
(B) Himalayan rivers flow through broad, shallow valleys, while Peninsular rivers flow through deep gorges.
(C) Himalayan rivers are perennial, while Peninsular rivers are largely rain-fed and seasonal.
(D) Himalayan rivers form estuaries, while Peninsular rivers form deltas.

182. Which of the following statements about natural vegetation in India is correct?
(A) Tropical Evergreen Forests are the most widespread in India.
(B) The type of vegetation changes with altitude in the Himalayan region.
(C) Teak is a dominant species of Mangrove forests.
(D) Thorn forests are found in areas of heavy rainfall.

183. The Planning Commission of India divided the country into how many agro-climatic zones for regional planning?
(A) 10
(B) 20
(C) 25
(D) 15

184. The 'youth bulge' in India's demographic profile presents:
(A) Potential demographic dividends and employment challenges.
(B) Only a challenge in terms of providing employment.
(C) Only an opportunity for economic growth (demographic dividend).
(D) A situation of a rapidly aging population with no economic benefit.

185. Consider the following statements:
(a) India is a major producer of both coal and iron ore.
(b) Most of India's petroleum reserves are

(e) Coal found in terrestrial mines.

Which of the above are considered 'marine resources'?

(A) (a), (b), and (c) only
(B) (a), (b), (c), and (d) only
(C) (c), (d), and (e) only
(D) All are correct.

205. The primary purpose of establishing Agro-Climatic Zones in India was:

(A) To realign state boundaries based on climate.
(B) To identify tourist destinations based on climate.
(C) To create a framework for scientifically diversifying cropping patterns.
(D) To set up weather forecasting stations.

206. A major negative social outcome of the Green Revolution was:

(A) A decrease in the overall standard of living.
(B) An increase in rural to urban migration.
(C) The complete collapse of the rural credit system.
(D) Increased income inequality between large and small farmers.

207. The period since 1991 in India is characterized by what trend in industrial policy?

(A) Liberalization, privatization, and globalization.
(B) Increased state intervention and licensing.
(C) A focus on heavy industries under public sector monopoly.
(D) The closure of all foreign companies in India.

208. The development of which of the following transport networks is crucial for connecting interior and remote areas of India?

(A) Airways
(B) Roadways
(C) Waterways
(D) Pipelines

209. The balance of trade for India has been persistently negative. This means:

(A) The value of exports is greater than the value of imports.
(B) The value of imports is greater than the value of exports.
(C) The volume of exports is greater than the volume of imports.
(D) Exports and imports are perfectly balanced.

210. What is the most significant impact of globalisation on the Indian agricultural sector?

(A) Farmers must compete with subsidised agriculture from abroad.
(B) It has completely shielded Indian farmers from price volatility.
(C) It has led to a uniform increase in income for all farmers.
(D) It has resulted in the complete abandonment of traditional farming practices.

211. Read the following assertion (A) and reason (R) and choose the correct option.

Assertion (A) : The Northern Plains of India are one of the most densely populated regions in the world.

Reason (R) : The plains have fertile alluvial soil, a favorable climate, and an adequate water supply, making them ideal for agriculture and human settlement.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

212. Which of the following is a major Himalayan Highland Hazard directly related to the cryosphere?

(A) Drought
(B) Heatwave
(C) Dust storm
(D) Glacial Lake Outburst Flood (GLOF)

213. The "Western Ghats" and "Eastern Ghats" are prominent features of which major physiographic region of India?

(A) The Himalayan Mountains
(B) The Northern Plains
(C) The Peninsular Plateau
(D) The Islands

214. The Brahmaputra river, upon entering Bangladesh, is known as:

(A) Padma
(B) Jamuna
(C) Meghna

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for a larger workforce.
(B) To improve the quality of life of the people.
(C) To achieve a stable population at a level consistent with sustainable development.
(D) To reduce infant and maternal mortality rates.

195. The 'Green Revolution' package did NOT include which of the following?
(A) High Yielding Variety (HYV) seeds
(B) Assured supply of water for irrigation
(C) Exclusive focus on organic farming methods
(D) Use of chemical fertilizers

196. The growth of major industrial regions like the Mumbai-Pune belt or the Hooghly belt is often associated with:
(A) Their isolated location far from any transport routes.
(B) The absence of a local labour force.
(C) A lack of raw materials in the vicinity.
(D) Historical advantages of port proximity and transport networks.

197. Which of the following best describes the development pattern of roadways in India?
(A) A highly uniform network with equal density in all parts of the country.
(B) A network dominated by unpaved village roads with very few national highways.
(C) Higher concentration of roads in plains versus hilly regions.
(D) A system that is completely independent of the railway network.

198. India's external trade direction has seen a shift in recent decades towards:
(A) A complete dependence on the United Kingdom.
(B) A diversification of partners, with an increasing share of trade with Asian and developing countries.
(C) Trading exclusively with North American countries.
(D) A reduction in trade with all neighbouring countries.

199. Regional Development Planning in India aims to address the problem of:
(A) National security.
(B) International relations.
(C) Linguistic conflicts.
(D) Imbalanced development and regional disparities.

200. Read the following statements and choose the correct option.
Statement I : The Indian cryosphere, particularly the Himalayan glaciers, is receding at an alarming rate.
Statement II : Global warming and increased pollution are major contributing factors to this phenomenon.
(A) Both statements are true, and Statement II explains Statement I.
(B) Both Statement I and Statement II are true, but Statement II is not the correct explanation for Statement I.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

201. Which of the following is a characteristic of the drainage pattern in the Peninsular Plateau?
(A) Primarily centripetal patterns.
(B) Antecedent and superimposed drainage.
(C) Mostly dendritic and radial patterns.
(D) A dense network of perennial canals.

202. The seasonal contrast in weather is minimal in which part of India?
(A) The Peninsular region, especially near the coast
(B) The Northern Plains
(C) The Himalayan region
(D) The Thar Desert

203. Which of the following factors has the most significant influence on the spatial distribution of population in India?
(A) The administrative headquarters of a district.
(B) The location of historical monuments.
(C) The alignment of international borders.
(D) The availability of water and the quality of land.

204. Consider the following resources:
(a) Fish and other aquatic organisms.
(b) Minerals like polymetallic nodules on the sea-bed.
(c) Tidal and wave energy.
(d) Mineral oil and gas from offshore fields.

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(C) Submergence of forests and displacement of communities.
(D) Improvement of groundwater levels in all areas.

228. Which of the following best describes the character of the Peninsular drainage system?
(A) Young rivers with active erosional features.
(B) Perennial rivers with a high volume of water throughout the year.
(C) A system where rivers frequently change their course.
(D) An old, super-imposed system with broad, graded valleys.

229. Match List I with List II and select the correct option using the codes given below.
List I: (Population Concept)
P. Population Growth
Q. Population Distribution
R. Population Composition
S. Population Determinant
List II: (Indicator)
1. Density of Population
2. Sex Ratio
3. Crude Birth Rate
4. Decadal Growth Rate
Codes:
(A) P-4, Q-1, R-2, S-3
(B) P-1, Q-4, R-3, S-2
(C) P-4, Q-2, R-1, S-3
(D) P-2, Q-1, R-4, S-3

230. The 'food security system' in India is composed of which two main components?
(A) National imports and international exports.
(B) Buffer stock and Public Distribution System.
(C) Organic farming and contract farming modes.
(D) Mid-day meal scheme and farmer loan system.

231. The North-South and East-West corridors of the NHDP intersect at which city?
(A) Nagpur
(B) Bhopal
(C) Delhi
(D) Jhansi

232. Consider the following statements about natural disasters in India:
(a) Earthquakes are most common in the peninsular shield area.
(b) Floods are a recurrent phenomenon in the Ganga and Brahmaputra basins.
(c) The eastern coast is more prone to cyclones than the western coast.
(d) Drought is a slow-onset disaster affecting large parts of western and central India.
Which of the above statement(s) is/are correct?
(A) (a), (b), and (c) only
(B) (b), (c), and (d) only
(C) (a), (c), and (d) only
(D) (a), (b), and (d) only

233. The 'Terai' region in the Northern Plains is known for being:
(A) A dry, pebbly zone where rivers disappear.
(B) A terrace of older alluvium above the flood plain.
(C) A swampy and marshy region with re-emerged streams and thick vegetation.
(D) A sandy desert with shifting dunes.

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234. The term 'Himalayan Cryosphere' is most significant for its role in:
(A) Regulating the water flow of North Indian rivers.
(B) Providing mineral resources.
(C) Influencing the ethnic composition of the region.
(D) Creating marine resources.

235. Which of the following is considered an 'institutional' factor affecting agriculture?
(A) Rainfall
(B) Soil type
(C) Temperature
(D) Land reforms

236. The Industrial Policy of 1991 aimed to:
(A) Increase industrial compulsory licensing numbers.
(B) Dismantle regulations and integrate globally.
(C) Strengthen the role of the public sector.
(D) Restrict entry of foreign tech and investment.

237. The 'direction' of India's foreign trade refers to:
(A) The specific goods being traded.
(B) The total value of goods being traded.
(C) The countries with which India trades.

(D) Dihang

215. The 'Tropical Easterly Jet Stream' is associated with which climatic phenomenon in India?
(A) The occurrence of Western Disturbances in winter.
(B) The retreat of the monsoon.
(C) The formation of Nor'westers.
(D) The onset of the Southwest Monsoon.

216. Which type of natural vegetation is found in the deltaic regions of the Ganga and Brahmaputra?
(A) Mangrove Forests
(B) Tropical Thorn Forests
(C) Montane Forests
(D) Tropical Deciduous Forests

217. The distribution of mineral resources in India is:
(A) Uniformly spread across all states.
(B) Concentrated exclusively in the Himalayan region.
(C) Highly uneven, with a major concentration in the Peninsular Plateau.
(D) Found only along the coastal plains.

218. The "dependency ratio" is a key indicator within which aspect of population composition?
(A) Age composition
(B) Religious composition
(C) Linguistic composition
(D) Ethnic composition

219. The 15 agro-climatic zones of India are primarily based on:
(A) Political boundaries and population density.
(B) Industrial development and transport connectivity.
(C) Historical and cultural factors.
(D) Characteristics of rainfall, temperature, soil, and water resources.

220. Which of the following pairs is incorrectly matched?
(A) Green Revolution - Food Grains
(B) Yellow Revolution - Jute Production
(C) White Revolution - Milk
(D) Blue Revolution - Fisheries

221. Read the following statements and choose the correct option.
Statement I : The Industrial Policy Resolution of 1956 is often called the "Economic Constitution" of India for its time.
Statement II : It laid down the foundational framework for a public sector-led, socialist pattern of industrial development.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

222. The Golden Quadrilateral project connects which four major metropolitan cities?
(A) Delhi, Mumbai, Bengaluru, Kolkata
(B) Delhi, Jaipur, Mumbai, Chennai
(C) Mumbai, Chennai, Hyderabad, Kolkata
(D) Delhi, Mumbai, Chennai, Kolkata

223. An increase in India's external trade volume since 1991 is a direct impact of:
(A) Policies of liberalisation and globalisation.
(B) Protectionist policies.
(C) A decline in domestic production.
(D) A global economic recession.

224. Which of the following is NOT a focus area of regional development planning in India?
(A) Development of backward regions.
(B) Focusing all national resources on a single metropolitan city.
(C) Reducing inter-state economic disparities.
(D) Hill area and tribal area development programs.

225. The high incidence of landslides and avalanches in the Himalayas makes it a region of:
(A) High agricultural productivity.
(B) Significant highland hazards.
(C) Stable geological activity.
(D) Ideal conditions for dense urban settlement.

226. Which state has the lowest population density in India as per Census 2011?
(A) Arunachal Pradesh
(B) Sikkim
(C) Mizoram
(D) Jammu and Kashmir

227. A key negative environmental impact of many large river valley projects in India has been:
(A) Increased biodiversity.
(B) Reduction in soil erosion.

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(B) Jamuna
(C) Padma
(D) Hooghly

249. Which of the following statements about the demographic composition of India is INCORRECT?
(A) India has a large 'youth bulge'.
(B) The literacy rate has shown improvement over the decades.
(C) There are significant rural-urban and male-female differentials in literacy.
(D) The sex ratio has been consistently above 1000 since 1951.

250. The transport network that is best suited for transporting liquids and gases over long distances is:
(A) Pipelines
(B) Railways
(C) Roadways
(D) Airways

Direction : Please read the following source carefully.

India's physiography is characterized by a remarkable diversity, delineated into several major regions, each with distinct geological and geomorphological attributes. The Himalayan mountain chain in the north, a young and tectonically active range, is defined by its towering peaks, deep valleys, and complex fold structures. Its characteristics are a direct result of the collision between the Indian and Eurasian plates. South of the Himalayas lies the vast Indo-Gangetic Plain, an extensive aggradational surface built by the alluvial deposits of the Indus, Ganga, and Brahmaputra river systems. This region's low relief and fertile soils make it one of the most densely populated agricultural heartlands in the world. The Peninsular Plateau, in contrast, is an ancient and stable landmass composed primarily of crystalline igneous and metamorphic rocks. It represents a horst-like feature, marked by rolling hills, broad valleys, and a general eastward slope, with its western flank forming the prominent Western Ghats. These major physiographic regions, with their unique characteristics, fundamentally influence the country's climate, drainage patterns, and resource distribution, creating a complex mosaic of physical landscapes. The interplay between these regions, such as the Himalayas acting as a climatic barrier and the source of perennial rivers that nourish the plains, underscores the integrated nature of India's geography.

Based on the above source, attempt the following five questions.

251. Which of the following statements best synthesizes the relationship between India's major physiographic regions as described in the paragraph?
(A) Each physiographic region functions as an isolated geographical unit with no influence on the others.
(B) The physiographic regions are interconnected, with features of one region significantly impacting others.
(C) The Peninsular Plateau is geologically younger than the Himalayan mountain chain.
(D) The characteristics of the Indo-Gangetic Plain are independent of the Himalayan and Peninsular regions.

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252. Based on the source, the primary reason for the high agricultural productivity of the Indo-Gangetic Plain is its:
(A) extensive alluvial deposits and low relief.
(B) tectonic stability and ancient rock composition.
(C) proximity to the tectonically active Himalayan chain.
(D) complex fold structures and deep valleys.

253. The paragraph contrasts the Peninsular Plateau with the Himalayas by highlighting which key characteristic?
(A) The Plateau is an aggradational surface while the Himalayas are an erosional feature.
(B) The Plateau is a young, tectonically active range while the Himalayas are ancient and stable.
(C) The Plateau is an ancient, stable landmass while the Himalayas are a young, tectonically active range.
(D) The Plateau is composed of alluvial deposits while the Himalayas are made of crystalline rocks.

(D) The mode of transport used for trade.

238. Which of the following is a major objective of Regional Development Planning?
(A) To concentrate all development in a single region.
(B) To stop all forms of economic development.
(C) To promote international migration.
(D) To ensure balanced and equitable development across all regions of a country.

239. The Latur earthquake of 1993 was a significant event because:
(A) It occurred in the Deccan Plateau, a region previously considered seismically stable or of low risk.
(B) It occurred in the highly seismic Himalayan zone as expected.
(C) It was the strongest earthquake ever recorded in India.
(D) It triggered a massive tsunami in the Arabian Sea.

240. The difference between the birth rate and the death rate of a country is called the:
(A) Total fertility rate.
(B) Natural growth rate.
(C) Overall migration rate.
(D) Population density.

241. Read the following statements and choose the correct option.
Statement I : The peninsular rivers are mostly non-perennial.
Statement II : They are dependent on monsoon rainfall for their water supply.
(A) Both statements are true, and Statement II explains Statement I.
(B) Both Statement I and Statement II are true, but Statement II is not the correct explanation of Statement I.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

242. The main characteristic of the summer season in North India is:
(A) Low pressure over the landmass and hot, dry winds called 'Loo'.
(B) High pressure over the landmass and cool, moist winds.
(C) Heavy cyclonic rainfall from western disturbances.
(D) Clear skies and pleasant temperatures.

243. The primary reason for the uneven distribution of mineral resources in India is:
(A) Differences in political governance.
(B) The pattern of population distribution.
(C) The variation in geological structure and processes across regions.
(D) The network of transportation.

244. A major achievement of the Green Revolution was:
(A) Eradicating rural poverty completely.
(B) Ensuring ecological balance in all agricultural regions.
(C) Reducing the gap between rich and poor farmers.
(D) Achieving self-sufficiency in food grain production.

245. The 'informal sector' dominates the occupational structure in urban India. This implies that:
(A) Workers have formal job contracts and social security.
(B) All urban workers are employed in the IT industry.
(C) Many workers have small, unregulated, low-pay jobs.
(D) There is no unemployment in urban areas.

246. Which of the following is NOT a consequence of globalisation on the Indian economy?
(A) Increased foreign investment.
(B) Complete insulation from global economic shocks.
(C) Increased competition for domestic producers.
(D) Greater access to global markets.

247. The National Disaster Management Authority (NDMA) in India operates at which level?
(A) State level
(B) District level
(C) Village level
(D) National level

248. The combined stream of the Ganga and Brahmaputra rivers, before it drains into the Bay of Bengal, is known as:
(A) Meghna

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mountain range.

165. The river that flows through a rift valley between the Vindhya and Satpura ranges is:
(A) Godavari
(B) Mahanadi
(C) Narmada
(D) Krishna

166. Which one of the following is a key feature of the Industrial Policy of 1991?
(A) Expansion of the public sector.
(B) Abolition of industrial licensing for most industries.
(C) Increased restrictions on foreign investment.
(D) Nationalization of private banks.

167. Read the following statements and choose the correct option.
Statement I : The productivity of Indian agriculture is low compared to international standards.
Statement II : This is primarily due to heavy dependence on monsoon, small and fragmented landholdings, and low levels of mechanization.
(A) Both statements are true, and Statement II explains Statement I.
(B) Both statements are true, but Statement II is not the explanation.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

168. The "Right to Food" campaign in India ultimately led to the enactment of:
(A) The National Food Security Act, 2013.
(B) The Essential Commodities Act.
(C) The establishment of the Food Corporation of India.
(D) The Green Revolution program.

169. Consider the following characteristics of industrial regions:
(a) Dominance of heavy metallurgical industries.
(b) A high concentration of public sector undertakings established in the 1950s.
(c) Leadership in IT, electronics, machine tools, and pharmaceuticals.
(d) Growth driven by skilled labor and research and development facilities.
(e) Primarily based on agro-processing of jute and tea.
Which of the above are the key characteristics of the industrial region centered around Bengaluru, Tamil Nadu, and Hyderabad?
(A) (a) and (b) only
(B) (c) and (d) only
(C) (d) and (e) only
(D) (a), (c), and (e) only

170. Which of the following is the most significant determinant of India's climate?
(A) The monsoon winds.
(B) The presence of the oceans on three sides.
(C) The latitudinal extent of the country.
(D) The Himalayan mountain range.

171. The Chota Nagpur plateau is considered a storehouse of which of the following resources?
(A) Fertile alluvial soils
(B) Vast water resources for irrigation
(C) Dense evergreen forests
(D) Rich deposits of minerals

172. Globalisation's impact on the Indian economy is characterized by:
(A) A decrease in competition for domestic industries.
(B) Greater integration with the world economy through trade and investment flows.
(C) A decline in the importance of the service sector.
(D) Increased government control over production and pricing.

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173. The primary reason for the high incidence of earthquakes in the Himalayan region is:
(A) Volcanic eruptions in the area.
(B) The melting of glaciers in the cryosphere.
(C) The collision of the Indian Plate with the Eurasian Plate.
(D) Heavy rainfall causing instability.

174. The "demographic transition theory" helps to explain which phenomenon in India?
(A) The shift from a rural to an urban society.
(B) The change in the occupational structure of the workforce.
(C) The increasing literacy rate in the country.
(D) The change in population from high birth and death rates to low birth and death rates.

254. An inference that can be drawn from the paragraph about the rivers of the Indo-Gangetic Plain is that they are likely to be:
(A) ephemeral, flowing only during the monsoon season.
(B) sourced primarily from the Peninsular Plateau.
(C) characterized by steep gradients and rapid flows throughout their course.
(D) perennial, fed by sources within the Himalayan region.

255. According to the passage, the fundamental structural identity of the Peninsular Plateau is that of:
(A) a complex fold system resulting from plate collision.
(B) a vast aggradational plain built by river deposits.
(C) an ancient and stable horst-like landmass.
(D) a young and tectonically active mountain chain.

Direction : Please read the following source carefully.

The drainage system of India is fundamentally bifurcated into the Himalayan and the Peninsular systems, each exhibiting distinct characteristics rooted in their geomorphological origins and climatic regimes. The Himalayan rivers, such as the Indus, Ganga, and Brahmaputra, are perennial in nature. Their flow is sustained by both meltwater from snow and glaciers in the high Himalayas and precipitation during the monsoon season. These rivers originate in the lofty mountain ranges and traverse long distances, carving deep gorges and V-shaped valleys in their upper courses before forming extensive plains and deltas in their lower reaches. In contrast, the Peninsular drainage system is considerably older and is primarily controlled by the topography of the ancient plateau. These rivers, including the Mahanadi, Godavari, Krishna, and Kaveri, are largely rain-fed and, therefore, exhibit significant seasonal fluctuations in their water volume, making them non-perennial or seasonal. Their courses are more graded and shallower compared to their Himalayan counterparts. The Peninsular system is further subdivided into east-flowing rivers that drain into the Bay of Bengal, forming large deltas, and west-flowing rivers like the Narmada and Tapi that flow through rift valleys and typically form estuaries rather than deltas. This fundamental division reflects the diverse geological history and climatic conditions across the subcontinent.

Based on the above source, attempt the following five questions.

256. Which characteristic most accurately distinguishes Himalayan rivers from Peninsular rivers as described in the text?
(A) Himalayan rivers are rain-fed, while Peninsular rivers are sustained by glacial meltwater.
(B) Himalayan rivers are perennial due to dual sources, while Peninsular rivers are largely seasonal and rain-fed.
(C) Himalayan rivers flow through rift valleys, while Peninsular rivers form deep gorges.
(D) Himalayan rivers are older with graded profiles, while Peninsular rivers are younger with V-shaped valleys.

257. According to the source, what is the primary reason for the perennial nature of Himalayan rivers?
(A) They flow over longer distances compared to Peninsular rivers.
(B) They originate in tectonically active zones, ensuring continuous water flow.
(C) They form extensive deltas that store water throughout the year.
(D) They are fed by both glacial meltwater and monsoon rainfall.

258. Based on the information provided, a key geomorphological difference between the east-flowing and west-flowing rivers of the Peninsular system is that:
(A) east-flowing rivers typically form deltas, while west-flowing ones often form estuaries.
(B) east-flowing rivers are perennial, while west-flowing rivers are seasonal.
(C) east-flowing rivers form estuaries, while west-flowing rivers form large deltas.
(D) east-flowing rivers are longer, while west-flowing rivers are short and swift.

259. The passage suggests that the course of a Peninsular river is largely determined by the:

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central to policy discourse, aiming to ensure that the gains in production translate into access to food for all citizens, addressing issues beyond mere agricultural output.

Based on the above source, attempt the following five questions.

281. What were the core technological components of the Green Revolution as described in the passage?
(A) HYV seeds, chemical fertilizers, and expanded irrigation.
(B) Traditional seeds, organic manure, and rain-fed farming.
(C) Land reforms, cooperative farming, and crop rotation.
(D) Agro-climatic zoning and computer-aided farm management.

282. The primary purpose of delineating India into Agro-Climatic Zones was to:
(A) enforce a uniform cropping pattern across the entire country.
(B) facilitate location-specific agricultural planning based on regional characteristics.
(C) focus exclusively on the regions that benefited from the Green Revolution.
(D) promote organic farming as the sole method of cultivation nationwide.

283. According to the text, a significant negative consequence of the Green Revolution was:
(A) a nationwide decrease in food grain production.
(B) the exacerbation of regional disparities in agricultural development.
(C) the complete failure of HYV seeds in Indian conditions.
(D) the decline in the use of irrigation facilities.

284. The passage suggests that institutional factors affecting agriculture include:
(A) aspects like land tenure, credit facilities, and government policies.
(B) only the annual rainfall and temperature patterns.
(C) only the types of seeds and fertilizers used.
(D) the natural topography and soil composition of a region.

285. How did the focus of agricultural policy evolve to include concepts like "Food Security" and the "Right to Food"?
(A) By deciding to import all food grains instead of producing them domestically.
(B) By abandoning the Green Revolution technologies entirely.
(C) By shifting focus from production to ensuring universal access to food.
(D) By concentrating all agricultural efforts only in the most productive zones.

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Direction : Please read the following source carefully.

Since independence, India's industrial development has undergone a transformative journey, guided by a series of industrial policies. The initial phase was characterized by a focus on public sector-led heavy industrialization, aiming to build a strong, self-reliant economic base. Over time, policies have evolved, particularly since the 1991 economic reforms, towards liberalization, privatization, and globalization, encouraging private sector participation and foreign investment. This development has not been spatially uniform, leading to the emergence of distinct industrial regions, each with its own set of characteristics. Major industrial regions, such as the Mumbai-Pune belt, the Hooghly (Kolkata) region, the Bengaluru-Tamil Nadu region, and the Chota Nagpur Plateau, have developed due to a combination of factors including proximity to raw materials, availability of power, access to markets, and historical precedence. For instance, the Chota Nagpur region's development is heavily linked to its rich mineral and coal deposits, fostering metallurgical and heavy engineering industries. The Mumbai-Pune region benefits from a port, a large market, and a diversified industrial base including textiles, petrochemicals, and automobiles. The characteristics of these regions are thus a product of their resource endowments and the prevailing industrial policies that shaped investment patterns over the decades.

Based on the above source, attempt the following five questions.

286. What was the principal characteristic of India's industrial policy in the initial post-independence phase?
(A) A focus on privatization and attracting

265. An inference from the text is that a weaker-than-normal thermal low over the subcontinent in summer, potentially due to extensive Himalayan snow cover, would likely lead to:
(A) a weaker monsoon circulation and potentially less rainfall.
(B) an early onset and a more intense monsoon.
(C) a delayed onset and a more vigorous monsoon.
(D) a strengthening of the Sub-Tropical Westerly Jet Stream over the plains.

Direction : Please read the following source carefully.

The distribution of natural resources in India is a direct reflection of its varied geology, climate, and topography. Among these, soil and vegetation are fundamental resources that exhibit significant spatial variation. India's soils can be broadly typed based on their genesis and characteristics. Alluvial soils, found extensively in the Indo-Gangetic plains and coastal regions, are highly fertile and support a dense agricultural population. Black soils (Regur), derived from volcanic rocks in the Deccan Plateau, are clayey, moisture-retentive, and ideal for cotton cultivation. Red and yellow soils are found in areas of lower rainfall on crystalline igneous rocks in the eastern and southern parts of the Peninsular Plateau, while laterite soils, characterized by leaching due to heavy rainfall and high temperatures, are common in the Western Ghats and parts of the northeast. The pattern of natural vegetation is closely correlated with climatic factors, primarily rainfall and temperature. Tropical evergreen forests are found in high-rainfall areas like the Western Ghats and the northeastern states. Tropical deciduous forests, the most widespread type, occupy regions with moderate rainfall. In drier areas of the Deccan Plateau and Rajasthan, thorny forests and scrubs dominate. Alpine vegetation is found at high altitudes in the Himalayas, demonstrating a clear vertical zonation pattern. This intricate distribution of soil and vegetation types underscores the diverse ecological zones within the country.

Based on the above source, attempt the following five questions.

266. Which soil type is specifically associated with the Deccan Plateau and known for its moisture-retentive properties?
(A) Alluvial soils
(B) Black soils (Regur)
(C) Laterite soils
(D) Red and yellow soils

267. According to the paragraph, the most widespread type of natural vegetation in India is:
(A) Tropical evergreen forests.
(B) Tropical deciduous forests.
(C) Alpine vegetation.
(D) Thorny forests and scrubs.

268. The passage implies a direct correlation between laterite soils and which specific climatic conditions?
(A) Heavy rainfall and high temperatures leading to leaching.
(B) Low rainfall and low temperatures.
(C) Moderate rainfall and moderate temperatures.
(D) Arid conditions with minimal precipitation.

269. Based on the information provided, in which of the following regions would one most likely find a vertical zonation of vegetation, transitioning to the Alpine type?
(A) The coastal plains of eastern India.
(B) The central part of the Deccan Plateau.
(C) The high-altitude areas of the Himalayas.
(D) The arid regions of Rajasthan.

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270. What is the primary factor that explains the formation of the fertile soils of the Indo-Gangetic plains as described in the source?
(A) The decomposition of volcanic rocks in situ.
(B) The process of leaching in high-rainfall zones.
(C) The weathering of ancient crystalline igneous rocks.
(D) The deposition of sediments by river systems.

Direction : Please read the following source carefully.

The population characteristics of India reveal a complex tapestry of spatial patterns, growth dynamics, and compositional diversity. The spatial pattern of distribution is highly uneven,

(D) They are the most cost-effective mode for bulk cargo movement.

293. The passage suggests that pipelines are a specialized transport network primarily used for:
(A) general passenger travel between cities.
(B) transporting perishable agricultural goods.
(C) connecting remote Himalayan villages.
(D) moving crude oil, petroleum products, and gas.

294. What change in the composition of India's external trade is highlighted in the text?
(A) A shift from manufactured goods to exporting only primary products.
(B) A diversification from primary products to include manufactured goods and services.
(C) A complete stop in the trade of services in favour of goods.
(D) A focus on trading exclusively with a single partner country.

295. Based on the source, where is the railway network described as being sparse?
(A) In the northern plains and coastal regions.
(B) In the Peninsular plateau and major industrial zones.
(C) In the Himalayan region and the northeast.
(D) In and around major metropolitan cities.

Direction : Please read the following source carefully.

India's unique geographical setting makes it vulnerable to a wide array of natural disasters, with specific hazards being more prevalent in certain regions. Earthquakes are a significant threat, particularly in the Himalayan belt and parts of western India, due to the active tectonic plate boundaries. The risk of drought is high in the semi-arid and arid regions of western and peninsular India, often linked to the failure or variability of the monsoon. Floods are a recurrent phenomenon, primarily affecting the vast plains of the Ganga and Brahmaputra rivers during the monsoon season due to heavy rainfall and siltation. The long coastline makes the eastern states especially vulnerable to tropical cyclones originating in the Bay of Bengal, which bring high-velocity winds and storm surges. Tsunamis, though less frequent, pose a threat to coastal communities, as tragically demonstrated in 2004. A distinct category of hazards is the Himalayan highland hazards, which include landslides, avalanches, and glacial lake outburst floods (GLOFs). These are often triggered by a combination of steep topography, fragile geology, and intense rainfall or seismic activity. Understanding the spatial pattern of these disasters is critical for effective regional development planning and disaster management, aiming to mitigate their impact on the economy and human lives.

Based on the above source, attempt the following five questions.

296. According to the passage, the Himalayan belt is particularly vulnerable to which two types of natural disasters?
(A) Droughts and Tsunamis
(B) Cyclones and Floods
(C) Tsunamis and Cyclones
(D) Earthquakes and Highland Hazards like landslides

297. The primary cause of floods in the Ganga and Brahmaputra plains, as mentioned in the text, is:
(A) heavy monsoon rainfall and river siltation.
(B) the occurrence of tsunamis in the Bay of Bengal.
(C) high-velocity winds during the dry season.
(D) frequent seismic activity in the plains.

298. Which region of India is described as being especially vulnerable to tropical cyclones?
(A) The arid regions of western India.
(B) The eastern coastal states.
(C) The northern Himalayan states.
(D) The central Deccan Plateau.

299. Glacial lake outburst floods (GLOFs) are categorized under which specific group of disasters in the source?
(A) Coastal hazards
(B) Himalayan highland hazards
(C) Arid zone hazards
(D) Peninsular plateau hazards

300. Based on the information provided, a failure of the monsoon is most likely to directly cause which natural disaster in western India?
(A) Drought (B) Earthquake
(C) Tsunami (D) Flood

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plain is a major region for wheat and rice, while coarse grains are prominent in the semi-arid regions of the Deccan. Regional variations in agricultural development are pronounced, with some areas exhibiting high levels of productivity and commercialization, while others remain characterized by subsistence farming and low yields. This disparity is a result of a combination of environmental, technological, and institutional factors that vary spatially. The challenge for Indian agriculture lies not just in increasing total production but also in enhancing yield and productivity across these diverse regions to ensure equitable development.

Based on the above source, attempt the following five questions.

276. What is the key distinction between 'production' and 'yield' as explained in the paragraph?
(A) Production is the total output, while yield is the output per unit of area.
(B) Production is output per unit of labour, while yield is total output.
(C) Production and yield are interchangeable terms for agricultural output.
(D) Production measures efficiency, while yield measures the total crop harvested.

277. According to the text, the Indo-Gangetic plain is identified as a major crop region for which of the following?
(A) Coarse grains and millets
(B) Cotton and sugarcane
(C) Spices and plantation crops
(D) Wheat and rice

278. The passage suggests that regional variations in agricultural development are primarily a result of:
(A) a uniform policy of collectivized farming across all states.
(B) the spatial differences in environmental, technological, and institutional factors.
(C) the exclusive focus on exporting a single cash crop nationwide.
(D) a national preference for subsistence farming over commercial agriculture.

279. An inference that can be drawn from the paragraph is that:
(A) high production in a region automatically guarantees high productivity and yield.
(B) major crop regions are designated by the government irrespective of agro-climatic conditions.
(C) a large total production figure for the country may mask significant regional disparities in agricultural efficiency.
(D) subsistence farming consistently results in higher yields than commercial farming.

280. The central challenge for Indian agriculture, as articulated in the source, is to:
(A) focus solely on increasing the total production of wheat and rice.
(B) transition completely from food crops to cash crops for export.
(C) decrease overall production to manage surplus and price fluctuations.
(D) improve yield and productivity across diverse regions, not just total output.

Direction : Please read the following source carefully.

The trajectory of Indian agriculture has been significantly shaped by a confluence of environmental, technological, and institutional factors. Environmentally, agriculture is intrinsically linked to climate, soil type, and water availability, which dictate the suitability of crops for a region. Technologically, the post-independence era, particularly since the mid-1960s, witnessed a paradigm shift with the advent of the Green Revolution. This involved the adoption of high-yielding variety (HYV) seeds, increased use of chemical fertilizers and pesticides, and expansion of irrigation facilities. While the Green Revolution led to a substantial increase in food grain production and helped achieve self-sufficiency, its benefits were initially concentrated in specific regions like Punjab, Haryana, and Western Uttar Pradesh, exacerbating regional disparities. To address such variations and promote holistic development, the concept of Agro-Climatic Zones was introduced, dividing the country into distinct zones based on climate, soil, and cropping patterns to facilitate location-specific agricultural planning. Institutionally, factors like land tenure systems, agricultural credit, marketing infrastructure, and government policies play a critical role. Initiatives related to food security and the Right to Food have become

NODIA

with high population densities concentrated in the fertile alluvial plains like the Ganga plain and coastal regions, while mountainous, arid, and forested tracts exhibit sparse populations. Population growth in India has been significant, though recent trends indicate a slowing growth rate. The composition of the population is multifaceted. The rural-urban divide remains prominent, with a large majority of the populace still residing in rural areas despite rapid urbanization. In terms of age composition, India has a youthful population, often referred to as a "demographic dividend," with a large proportion in the younger age brackets. The sex composition, however, is marked by regional variations in the sex ratio. Furthermore, the population is diverse in its occupational structure, with a gradual shift from primary agricultural activities to secondary and tertiary sectors, though agriculture remains a major employer. The educational composition is improving, but disparities persist. The ethnic and religious composition is exceptionally heterogeneous, with a multitude of ethnic groups and the presence of all major world religions, contributing to a rich cultural mosaic. These population characteristics are shaped by a combination of physical, socio-economic, and historical determinants.

Based on the above source, attempt the following five questions.

271. According to the paragraph, which of the following regions in India would most likely have a high population density?
(A) The arid regions of the Thar Desert.
(B) The mountainous terrains of the Himalayas.
(C) The fertile alluvial plains of the Ganga river.
(D) The forested tracts of the northeastern states.

272. The term "demographic dividend" as used in the source refers to the characteristic of India's population having:
(A) a high proportion of people living in urban areas.
(B) a large proportion of people in the younger age brackets.
(C) an equal distribution of males and females across all states.
(D) a majority of the workforce engaged in the tertiary sector.

273. Which statement best describes the occupational composition of India's population as per the text?
(A) The entire workforce has shifted to the secondary and tertiary sectors.
(B) The primary sector has been completely abandoned in favour of industry.
(C) The occupational structure is static with no discernible shifts between sectors.
(D) There is a gradual shift away from agriculture, but it remains a major employer.

274. Based on the source, what can be inferred about India's population distribution?
(A) Physical geography, such as fertile land, plays a significant role in population concentration.
(B) Population is evenly distributed across all physiographic regions.
(C) Economic factors are the sole determinant of population settlement.
(D) Religious composition is the primary factor influencing spatial patterns of distribution.

275. The paragraph highlights that India's population composition is multifaceted. Which of the following is NOT mentioned as a component of this composition?
(A) Rural-urban composition
(B) Age and sex composition
(C) Genetic and biological composition
(D) Occupational and educational composition

Direction : Please read the following source carefully.

Indian agriculture is defined by complex interrelationships between production, productivity, and the yield of major food crops. Production refers to the total output of a crop, while productivity is the efficiency of production, often measured as output per unit of input (like land or labour). Yield, a specific measure of productivity, typically refers to the output per unit of area. India has achieved significant increases in the production of major food crops, such as rice and wheat, which form the cornerstone of the nation's food security. However, these gains are not uniform across the country, leading to the formation of major crop regions where specific crops dominate due to favourable agro-climatic conditions. For instance, the Indo-Gangetic

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foreign investment.
(B) An emphasis on small-scale and cottage industries exclusively.
(C) A policy of de-industrialization to promote agriculture.
(D) A strategy centered on public sector-led heavy industrialization.

287. According to the paragraph, the industrial development of the Chota Nagpur Plateau is primarily attributed to its:
(A) proximity to a major port and large consumer market.
(B) historical role as a center for the textile industry.
(C) rich deposits of minerals and coal.
(D) well-developed IT and software services sector.

288. The passage identifies the shift in industrial policy since 1991 as being towards:
(A) strengthening state control over all industries.
(B) liberalization, privatization, and globalization.
(C) focusing exclusively on agro-based industries.
(D) closing down all private sector enterprises.

289. Which of the following is NOT mentioned in the text as a factor contributing to the formation of industrial regions?
(A) Proximity to raw materials
(B) Availability of power
(C) Access to markets
(D) Uniform climatic conditions

290. An inference from the passage is that the characteristics of an industrial region like the Mumbai-Pune belt are:
(A) a product of a mix of factors including location, resources, and policy.
(B) solely a result of government planning without any private sector role.
(C) static and have not changed since independence.
(D) entirely dependent on a single industry, such as textiles.

Direction : Please read the following source carefully.

The development of transport networks in India is crucial for economic integration and regional development. The country possesses a diversified system comprising railways, roadways, waterways, airways, and pipelines, each with distinct patterns and roles. The railway network, a legacy of the colonial era, is one of the world's largest, serving as the backbone for long-distance freight and passenger movement. Its pattern is dense in the northern plains and peninsular plateau but sparse in the Himalayan region and the northeast. Roadways offer door-to-door service and are critical for connecting rural and remote areas, with recent policies focusing on high-quality national highways. Waterways, both inland and coastal, are an underutilized but cost-effective and environmentally friendly mode, particularly for bulk cargo. Airways have seen rapid growth, connecting major metropolitan cities and becoming increasingly accessible for passenger travel. Pipelines are a specialized mode, essential for the efficient transport of crude oil, petroleum products, and natural gas. These transport networks facilitate both internal and external trade. Internal trade involves the movement of goods between states, while external trade has seen significant shifts in its trend, composition, and direction. The composition has diversified from primary products to manufactured goods and services, and the direction has expanded from a few trading partners to a more globalized pattern, reflecting the impact of economic liberalization.

Based on the above source, attempt the following five questions.

291. Which mode of transport is described as the "backbone" for long-distance movement and has a dense pattern in the northern plains?
(A) Airways
(B) Waterways
(C) Railways
(D) Pipelines

292. According to the paragraph, what is the primary advantage of roadways over other modes of transport?
(A) They offer door-to-door service and connectivity to remote areas.
(B) They are the fastest mode for long-distance travel.
(C) They are the most suitable for transporting liquid and gaseous products.

NODIA

(A) amount of annual monsoon precipitation.
(B) influence of Himalayan tectonic activity.
(C) existing topography of the ancient plateau landmass.
(D) volume of meltwater from high-altitude glaciers.

260. An inference drawn from the text is that the erosional capacity of Himalayan rivers in their upper courses is significantly high due to their:
(A) origin in high mountains leading to steep gradients.
(B) seasonal flow and graded profiles.
(C) formation of estuaries at their mouths.
(D) path through stable and ancient landmasses.

Direction : Please read the following source carefully.

The Indian Monsoon is a complex meteorological phenomenon central to the subcontinent's climate, characterized by a seasonal reversal of winds. Its mechanism is driven by the differential heating of the landmass and the adjacent ocean, creating a low-pressure thermal low over the Indian subcontinent during the summer. This invites moisture-laden winds from the high-pressure region over the Indian Ocean. The arrival of the monsoon brings a dramatic shift in seasonal weather characteristics, marking the transition from the hot, dry summer to the rainy season. A critical component influencing the monsoon's behavior is the role of Jet Streams. The Sub-Tropical Westerly Jet Stream, prevalent over northern India during winter, shifts north of the Himalayas in summer, allowing the Tropical Easterly Jet Stream to establish itself over Peninsular India, which is crucial for the monsoon's onset and intensity. Furthermore, the Himalayan Cryosphere, encompassing glaciers and snow cover, exerts a significant influence. The extent of snow cover over the Himalayas and the Tibetan Plateau can modulate the strength of the summer thermal low, thereby affecting the vigour of the monsoon circulation. The characteristics of the monsoon include its pulsatory nature, with active and break spells, and its uneven spatial and temporal distribution of rainfall, making it a system of both immense benefit and potential hazard.

Based on the above source, attempt the following five questions.

261. What is the fundamental mechanism driving the Indian Monsoon as explained in the paragraph?
(A) The permanent presence of the Tropical Easterly Jet Stream over Peninsular India.
(B) The consistent snowmelt from the Himalayan Cryosphere throughout the year.
(C) The seasonal stability of wind patterns without any reversal.
(D) The differential heating of the Indian landmass and the surrounding ocean.

262. According to the source, what is the specific role of the Jet Streams in the context of the Indian Monsoon's onset?
(A) The Tropical Easterly Jet Stream shifts north of the Himalayas, strengthening winter conditions.
(B) The Sub-Tropical Westerly Jet Stream's northward shift in summer facilitates the monsoon's establishment.
(C) Both the Westerly and Easterly Jet Streams remain stationary over India throughout the year.
(D) The Sub-Tropical Westerly Jet Stream intensifies over northern India during the summer, triggering rainfall.

263. The passage suggests a relationship between the Himalayan Cryosphere and the monsoon, where:
(A) increased snow cover consistently leads to a stronger monsoon.
(B) the cryosphere's influence is limited to providing perennial water to rivers.
(C) the extent of snow cover can modulate the thermal low over the subcontinent.
(D) the Himalayan Cryosphere is the primary trigger for the seasonal wind reversal.

264. Which of the following is described as a key characteristic of the Indian Monsoon's behaviour?
(A) A uniform and even distribution of rainfall across the entire country.
(B) A continuous, non-stop period of rain from June to September.
(C) Its complete independence from upper-air atmospheric circulations like Jet Streams.
(D) Its pulsatory nature, featuring alternating periods of active rain and dry breaks.

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ANSWERS

1. (B) The rivers are perennial, being fed by both glaciers and rainfall.
Himalayan rivers originate in the high-altitude snow-capped ranges and receive water from melting glaciers. Additionally, these river systems are augmented by heavy rainfall during the monsoon season. This dual source of water ensures a continuous flow throughout the year, making them perennial. These rivers contrast with peninsular systems which depend primarily on seasonal rain and often dry up during the summer months.

2. (A) Both Statement I and Statement II are true.
The Indian monsoon is a complex atmospheric phenomenon defined by the complete seasonal reversal of wind direction. During summer, moisture-laden winds blow from the sea toward the land, while in winter, dry winds blow from the land toward the sea. Simultaneously, the massive Himalayan mountain range acts as a physical barrier. This range protects the Indian subcontinent from the frigid polar air masses of Central Asia.

3. (C) The sex ratio has consistently been favorable to females since independence.
Since the start of the twentieth century, the child sex ratio and the overall sex ratio in India have generally remained unfavorable to females. Statistical data from various census reports indicate a persistent decline or stagnation in the number of females per thousand males. This demographic trend is attributed to various socio-economic factors, including gender bias and preference for male children in many regions of the country.

4. (D) Wheat and Rice
The introduction of high-yielding variety seeds during the mid-sixties transformed Indian agriculture. This initiative focused heavily on the intensive cultivation of specific cereal crops using modern inputs like chemical fertilizers and irrigation. Consequently, the production of wheat and rice saw a dramatic increase, particularly in the northern plains. This productivity boost helped India transition from a food-deficient nation to a state of self-sufficiency.

5. (A) P-3, Q-1, R-2, S-4
Industrial development in India is concentrated in specific clusters based on resource availability and historical factors. The Mumbai-Pune region is a major hub for cotton textiles and petrochemicals. The Hooghly region is traditionally centered on jute manufacturing and engineering near Kolkata. Chota Nagpur is the heart of heavy metallurgical industries due to mineral wealth. Meanwhile, the Bengaluru-Tamil Nadu region leads in high-tech sectors like electronics and information technology.

6. (B) Western Disturbances from the Mediterranean Sea.
During the winter months, the northwestern parts of India receive precipitation due to cyclonic disturbances. These storms originate over the Mediterranean Sea and travel eastward across West Asia and Pakistan before entering the Indian subcontinent. These western disturbances are crucial for the growth of rabi crops like wheat. They are guided by the sub-tropical westerly jet stream, bringing much-needed moisture to regions like Punjab and Haryana.

NODIA

(D) Black Soil (Regur)
Black soil, also known as regur, is predominantly found in the volcanic Deccan Trap region. It is characterized by a high clay content, which grants it excellent moisture-holding capacity. During the dry season, the soil loses moisture and develops deep, wide cracks, facilitating aeration. Because of its unique mineral composition and physical properties, it is exceptionally suitable for the cultivation of crops like cotton and soybean.

8. (A) Both A and R are true and R is the correct explanation of A.
The topography of Peninsular India consists of ancient, hard, and rocky terrain that dictates the flow of its rivers. These rivers are primarily rain-fed and exhibit significant seasonal variations in water volume, often drying up during the

summer. Such fluctuations, combined with the presence of numerous rapids and waterfalls throughout their course, make them unsuitable for navigation. Consequently, they lack the steady flow required for transport.

9. (C) It is known for the presence of large glaciers and high snow-capped peaks.
The Shiwalik Range represents the youngest and southernmost part of the Himalayan mountain system. It is composed of unconsolidated sediments brought down by rivers from the higher ranges to the north. While this region features longitudinal valleys known as Duns, it lacks the extreme altitudes necessary for permanent snow cover. Major glaciers and high snow-capped peaks are found in the Greater Himalayas or Himadri, not the Shiwaliks.

10. (A) The National Food Security Act, 2013
Legal backing for the right to food in India was established through a landmark legislative act passed in 2013. This legislation aims to provide food and nutritional security by ensuring access to adequate quantities of quality food at affordable prices. It makes the provision of subsidized food grains a legal entitlement for nearly two-thirds of the population. This systemic change shifted the approach from welfare-based to rights-based.

11. (A) (a), (b), and (d) only
The spatial and temporal dynamics of the Indian population are driven by birth rates, death rates, and migration. While birth and death rates have declined, the death rate dropped more significantly due to improved healthcare. Internal migration plays a vital role in redistributing the population within states. However, international migration has a negligible impact on India's total population size compared to natural increase and massive internal movements.

12. (B) Portions of the Earth's surface where water exists in solid form.
The cryosphere encompasses all components of the Earth system where water is frozen, including glaciers, snow cover, and permafrost. In the Himalayan context, this frozen reservoir is vital as it feeds major river systems. These glaciers act as a giant water tower for the Indian subcontinent. Changes in the cryosphere due to global temperature rise directly affect the long-term water security of millions of people downstream.

13. (C) Railways
The Indian railway network is the backbone of the country's transport system for moving heavy goods over long distances. It carries a significant portion of the total freight traffic measured in tonne-kilometres. This mode of transport is highly efficient for transporting bulk commodities like coal, iron ore, and food grains. Despite the growth of roadways, railways remain the primary choice for industrial and bulk freight movement.

14. (A) (iv), (i), (iii), (ii)
The institutional framework for India's economic development began with the establishment of the Planning Commission in 1950. This was followed by the launch of the First Five-Year Plan in 1951. Later, the 1956 Industrial Policy Resolution emphasized a socialistic pattern with public sector dominance. Finally, the 1991 New Industrial Policy introduced economic liberalization. This sequence reflects the shift from a state-controlled to a more market-oriented economy.

15. (A) A substantial increase in Foreign Direct Investment (FDI) inflows.
The opening of the Indian economy in 1991 led to a significant increase in international capital movement. Globalisation facilitated the easing of restrictions on foreign investment, resulting in a substantial rise in Foreign Direct Investment inflows. This capital influx helped modernize industries, create jobs, and integrate India into the global supply chain. It transformed various sectors, particularly services and manufacturing, by providing access to advanced technology and global markets.

16. (B) The older alluvium, forming terraces above the floodplains.
The Great Northern Plains exhibit various physiographic features based on the nature of alluvial deposits. Bhangar refers to the older alluvium that forms the higher part of the plains. These regions are generally located above the current flood levels of the rivers and often appear as terraces. The soil in these areas frequently contains calcareous deposits known as kankar.

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This contrasts with khadar, which is newer alluvium.

17. (A) (a), (b), and (c)
India's industrial strategy evolved from heavy state control to market liberalization. The 1956 Resolution established a strong public sector foundation. By 1991, the government introduced radical reforms to boost efficiency. These reforms included abolishing industrial licensing for most sectors and liberalizing foreign investment rules. However, the MRTP Act was actually relaxed rather than strengthened to encourage industrial growth. Thus, the focus shifted toward competition and global integration.

18. (B) Both Statement I and Statement II are true, but Statement II is not the correct explanation of Statement I.
The coastal topography of India differs significantly between the east and west. The Eastern Coastal Plain is wider and exhibits an emergent nature compared to the narrow Western Coastal Plain. This width is partly due to the depositional activities of major rivers like the Mahanadi and Godavari. These rivers carry massive sediment loads that form large deltas at their mouths. Both statements accurately describe independent physical characteristics.

19. (C) Coal, Iron ore, and Mica
The Chota Nagpur Plateau is often referred to as the mineral heartland of India. It possesses vast reserves of various metallic and non-metallic minerals. Specifically, the region is well-known for its extensive coal fields, high-grade iron ore deposits, and mica mines. These resources have fostered the development of heavy metallurgical industries and power plants in the surrounding area. The geological structure of this plateau makes it exceptionally rich.

20. (A) Both A and R are true and R is the correct explanation of A.
The increasing frequency and severity of floods across India are closely linked to human interference with natural ecosystems. Clearing forests in the catchment areas of major rivers reduces the soil's ability to absorb rainwater, leading to rapid runoff. Additionally, unplanned urbanization creates impervious surfaces and blocks natural drainage paths. These factors combine to overwhelm river channels during heavy rainfall, resulting in devastating floods that damage property and life.

21. (C) Output per unit of land area (e.g., tonnes per hectare).
In the context of agricultural economics, productivity is a measure of the efficiency of production. It is most commonly expressed as the output obtained from a specific unit of land area. For example, it is calculated in terms of kilograms or tonnes harvested per hectare. This metric allows for a comparative analysis of agricultural performance across different regions and identifies the impact of technological inputs on farming.

22. (B) 2045
The National Population Policy formulated in 2000 provided a comprehensive framework for achieving population stabilization. Its primary objective was to address the immediate needs of reproductive healthcare and contraception. The long-term goal of the policy was to reach a stable population by the year 2045. This target was set to ensure that population growth is consistent with the requirements of sustainable economic development and social progress in India.

23. (A) (a), (b), (c), and (e) only
India's diverse climate supports various forest types, ranging from tropical evergreen to montane. Evergreen forests thrive in high rainfall zones, while thorn forests are found in arid regions. Tropical deciduous forests are the most widespread throughout the country. Montane vegetation changes according to altitude, reflecting a transition from tropical to tundra types. However, mangrove forests are characterized by salt-tolerant species like Sundari, not by coniferous trees found in mountains.

24. (A) Narmada
Most major rivers of the Peninsular Plateau flow eastward and drain into the Bay of Bengal because of the general slope of the land. However, the Narmada is a notable exception as it flows westward through a rift valley between the Vindhya and Satpura ranges. This river eventually discharges its water into the Arabian Sea. It originates in the Amarkantak plateau and follows a rocky, steep course.

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71. (D) Hazira-Vijaipur-Jagdishpur (HVJ) pipeline
Pipeline transport is an efficient mode for moving liquids and gases over long distances. In India, most pipelines are used for transporting crude oil and petroleum products. However, the Hazira-Vijaipur-Jagdishpur (HVJ) pipeline is a notable example of a network designed for a different purpose. It is a major cross-country pipeline primarily used for the transportation of natural gas. This gas is supplied to various fertilizer and power plants in northern and western India, supporting industrial and agricultural development.

72. (A) Saffron
The Kashmir valley is characterized by unique geological formations known as Karewas, which are thick deposits of glacial clay and other sediments. These lacustrine deposits form flat-topped mounds and are highly fertile. They are especially famous for the cultivation of saffron, a high-value spice. The specific soil composition and climatic conditions of the Karewas provide an ideal environment for saffron farming, making this region the only significant producer of the crop in the entire Indian subcontinent.

73. (D) (a), (b), (c), and (d)
Indian agriculture possesses several distinctive features that shape its overall performance. A significant portion of farming is still dependent on the vagaries of the monsoon rainfall. Most farmers practice subsistence agriculture on small landholdings, focusing on meeting their own needs. Furthermore, the sector is characterized by low productivity levels compared to global standards and widespread disguised unemployment, where more labor is employed than necessary. Together, these factors highlight the traditional and challenging nature of the agricultural sector in India.

74. (A) Economic growth potential due to more people in the working-age group.
The demographic dividend refers to the potential for accelerated economic growth that can occur when a country's working-age population is larger than its dependent population. In the context of India, the high proportion of young people indicates a transition where more individuals can contribute to production and savings. This dividend is not automatic but depends on the availability of quality education, healthcare, and employment opportunities. Successfully harnessing this youthful energy can significantly boost the nation's overall socio-economic development and prosperity.

75. (D) Three
The Industrial Policy Resolution of 1956 was a landmark document that defined the role of the state in India's industrial development. It classified industries into three distinct schedules or categories. Schedule A included industries that were the exclusive responsibility of the state. Schedule B comprised industries that would be progressively state-owned, but where the private sector could supplement state efforts. Schedule C included all remaining industries, which were left open to the private sector, albeit subject to government regulation and planning.

76. (B) West Bengal and Assam
During the summer season, parts of India experience localized thunderstorms accompanied by strong winds and heavy rain. In West Bengal and Assam, these storms are known as 'Kal Baisakhi' or 'Nor'westers'. They usually occur in the evening and are caused by the interaction of warm, moist air from the Bay of Bengal with cool, dry air from the plateau. While they can be destructive, these rains are also beneficial for the cultivation of crops like rice and jute in the region.

77. (C) A significant increase in the volume and value of trade, but with a persistent trade deficit.
Since the economic reforms of 1991, India's external trade has witnessed a remarkable transformation. Policies of liberalization and globalization have led to a significant increase in both the volume and value of exports and imports. India has diversified its trade partners and expanded its export basket. However, despite the growth in exports, the value of imports has consistently remained higher, primarily due to the large demand for crude oil and capital goods. This has resulted in a persistent trade deficit.

78. (A) P-2, Q-4, R-1, S-3
India's diverse geological and climatic conditions have produced various soil types with distinct characteristics. Alluvial soil, found in the plains, is rich in potash but generally poor in phosphorus.

NODIA

33. (B) The Bay of Bengal branch is responsible for rainfall in the Ganga plains.
The Indian monsoon is driven by two main branches: the Arabian Sea branch and the Bay of Bengal branch. After crossing the Bay of Bengal, the latter branch is diverted westward by the Himalayan mountains. It moves along the Ganga plains, bringing significant rainfall to the northern part of the country. Onset typically begins in Kerala in early June. El Niño is generally associated with weaker monsoons, contrary to common misconceptions about its impact.

34. (A) (ii), (iv), (i), (iii)
The physical features of India follow a specific latitudinal arrangement from the north to the south. The Shiwalik Range represents the southernmost foothills of the Himalayas. Immediately south of the Shiwaliks lies the Terai region, characterized by marshy lands. Further south, one encounters the Malwa Plateau in the central part of the country. Finally, the Deccan Traps occupy a large portion of the southern peninsula, formed by ancient volcanic activity.

35. (C) Developing region-specific agricultural planning and strategies.
Agricultural planning in India requires a regional approach due to the diversity in climate and soil. The country was divided into fifteen agro-climatic zones based on parameters like rainfall, temperature, and water availability. This classification helps in developing specific strategies for crop diversification, irrigation management, and livestock development. By tailoring agricultural policies to the local environment, the government aims to increase productivity and ensure sustainable resource use across different geographical regions.

36. (B) (b), (c), and (d) only
India's external trade has undergone significant changes in its composition and direction. Petroleum and lubricants remain a major part of the import bill due to high domestic demand. In exports, engineering goods and gems and jewellery have emerged as leading sectors. Major trading partners include developed regions like the European Union and North America. However, the share of agricultural products in total exports has generally been declining as the economy diversifies into manufacturing and services.

37. (A) Both statements are true, and Statement II explains Statement I.
Black soil is renowned for its high fertility and specific physical properties that make it ideal for cotton cultivation. This soil type is rich in minerals like lime, iron, and magnesium. One of its most significant characteristics is its exceptional water retention capacity, which allows it to support crops even during dry periods. Because of these favorable chemical and physical attributes, it is the preferred soil for growing cotton in the Deccan region.

38. (B) The Railway Board
The management of the vast Indian railway network is organized into several administrative layers. While the entire network is divided into various zones for operational efficiency, the central authority for policy formulation and overall administration is the Railway Board. This body functions under the Ministry of Railways and is responsible for making critical decisions regarding infrastructure development, safety, and financial management. It ensures a coordinated approach to the functioning of the entire national rail system.

39. (D) A high proportion of the population in the young age group (youth bulge).
India is currently undergoing a significant demographic transition characterized by a very large proportion of young people in its population. This phenomenon, known as a youth bulge, indicates that a high percentage of the inhabitants are in the working-age group. This profile offers a unique opportunity for economic growth, provided there are adequate investments in education and job creation. It contrasts with many developed nations that are facing the challenges of an aging population.

40. (A) Both A and R are true and R is the correct explanation of A.
During the southwest monsoon, moisture-laden winds from the Arabian Sea strike the Western Ghats. These mountains act as a formidable physical barrier, forcing the air to rise and cool. This process leads to heavy orographic rainfall on the windward side, which is the western coast. In

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56. (A) Land tenure system
Agricultural development is influenced by both physical and human factors. Institutional factors refer to the human-made frameworks that govern land use and ownership. The land tenure system, which defines the rights and obligations of landholders, is a critical institutional factor. It affects a farmer's incentive to invest in land improvements and adopt new technologies. In India, issues like small landholdings and lack of clear titles have traditionally hindered agricultural productivity, necessitating various land reform measures.

57. (C) Agro-based industries and mineral-based industries like steel and shipbuilding.
The Visakhapatnam-Guntur industrial belt is an important economic region in Andhra Pradesh. Its development is driven by the presence of major ports and the availability of diverse resources. The region is home to a variety of industries, including agro-processing based on local agricultural produce. It is also a significant hub for mineral-based industries, particularly iron and steel, as well as shipbuilding and petroleum refining. This mix of industrial activities contributes significantly to the regional and national economy.

58. (A) Increased exposure of Indian farmers to international competition.
The integration of the Indian economy with global markets has had a profound impact on the agricultural sector. Globalisation has increased the exposure of Indian farmers to international competition, as trade barriers have been lowered. Farmers now face fluctuations in global prices for their produce and must compete with highly subsidized agriculture from developed nations. While this has opened up new markets for some cash crops, it has also created challenges regarding price stability and livelihood security for others.

59. (C) P-4, Q-1, R-2, S-3
The natural vegetation of India is categorized into different types based on rainfall and temperature. Tropical evergreen forests are dominated by species like rosewood and ebony. In contrast, tropical deciduous forests, which are the most widespread, feature trees such as teak and sal. Arid regions support tropical thorn forests with species like kikar and babool. Coastal and deltaic areas are home to mangrove forests, where the Sundari tree is the most well-known and dominant species.

60. (B) The Andaman and Nicobar Islands and the Coromandel Coast
The Indian Ocean tsunami of 2004 was one of the most devastating natural disasters in recent history. It was triggered by a massive undersea earthquake near Sumatra, Indonesia. The resulting waves caused widespread destruction along the eastern coast of India and the outlying islands. The Andaman and Nicobar Islands and the Coromandel Coast were the hardest hit, suffering immense loss of life and property. This event highlighted the vulnerability of coastal communities to rare but extreme marine hazards.

61. (C) The majority is rural, but the urban population grows at a faster rate.
India's population remains predominantly rural, with a large majority of the people living in villages. However, recent decades have seen a steady increase in the urban population. While the absolute number of people in rural areas is high, the urban population is growing at a much faster rate due to natural increase and migration from rural to urban centers. This shifting composition reflects the ongoing process of urbanization and the changing economic structure of the country toward services and industries.

62. (D) Basaltic rocks of volcanic origin
The Deccan Traps is a large igneous province located on the Peninsular Plateau of India. This region was formed by massive volcanic eruptions that occurred millions of years ago. The successive flows of lava solidified to form thick layers of basaltic rocks. Over time, the weathering of these rocks has produced the fertile black soil that characterizes much of the region. The stepped or plateau-like appearance of the landscape is a direct result of these ancient volcanic activities.

NODIA

63. (A) Rubber
Indian agriculture is dominated by a variety of food crops that provide sustenance to the large population. Rice, wheat, and millets are the primary staples grown across different regions based on climate and soil suitability. In contrast, rubber is a plantation crop that is grown primarily

Hemisphere. As these winds cross the equator, they are deflected to the right in the Northern Hemisphere due to the Coriolis force, which is caused by the Earth's rotation. This deflection changes their direction, making them blow from the southwest toward the Indian landmass. These moisture-laden winds are responsible for the bulk of the rainfall received by the Indian subcontinent during summer.

49. (B) Intense leaching due to heavy rainfall, leaving behind iron and aluminum oxides.
Laterite soils are formed in tropical regions with high temperatures and heavy seasonal rainfall. These conditions lead to intense leaching, where silica and other minerals are washed away, leaving behind a soil rich in iron and aluminum oxides. Consequently, these soils are generally acidic and low in fertility and organic matter. They are found in parts of the Western Ghats and Odisha and are often used as building material due to their hardness when dry.

50. (A) (i), (ii), (iii), (iv)
The length of a state's coastline depends on its geographical shape and the presence of indentations. Among Indian states, Gujarat possesses the longest coastline due to its numerous gulfs and peninsular structure. Andhra Pradesh follows with a significant coastline along the Bay of Bengal. Tamil Nadu and Maharashtra also have extensive shores. When comparing the specific states listed, Gujarat ranks first, followed by Andhra Pradesh, then Tamil Nadu, and finally Kerala, reflecting their respective coastal lengths.

51. (A) Both Statement I and Statement II are true.
The Golden Quadrilateral is a massive highway development project that forms the backbone of India's road infrastructure. It connects the four major metropolitan cities of Delhi, Mumbai, Chennai, and Kolkata. The primary goal of this network is to facilitate faster movement of goods and people across the country. By providing high-quality, multi-lane roads, the project significantly reduces travel time and transportation costs, thereby boosting trade, industrial growth, and overall national economic integration.

52. (D) The availability of natural resources like water and fertile land.
The spatial distribution of the Indian population is primarily influenced by physical and environmental factors. Areas with fertile alluvial soil and an abundant supply of water, such as the Northern Plains and coastal regions, have historically supported high population densities. These resources are essential for agriculture, which remains the mainstay for many people. While industrialization and urbanization also play a role, the fundamental availability of natural resources remains the most significant determinant of where people live.

53. (A) (a), (b), and (d)
Many rivers in the Himalayan system, such as the Indus and Brahmaputra, are older than the mountains themselves. They maintained their courses while the mountains rose by cutting deep gorges, a feature known as antecedent drainage. These rivers have massive catchment areas and carry huge volumes of water and silt. Due to the heavy sediment load and the gentle slope of the plains, they are prone to frequent changes in their courses, causing significant flooding.

54. (B) Clear skies and a rise in temperature in North India, known as 'October heat'.
The post-monsoon season occurs during October and November as the southwest monsoon winds withdraw from the country. This period is characterized by clear skies and a gradual decrease in humidity. In North India, there is a temporary rise in temperature combined with high humidity, a phenomenon popularly known as 'October heat'. During this time, the low-pressure center shifts to the Bay of Bengal, often leading to the formation of cyclonic storms that affect the eastern coast.

55. (A) Both A and R are true and R is the correct explanation of A.
India is renowned for its immense ethnic and cultural diversity, which has evolved over thousands of years. This diversity is the result of continuous waves of migration from various parts of Asia and the world. Different groups brought their unique languages, traditions, and physical characteristics, contributing to the complex social fabric of the country. Historical records and genetic studies confirm that India has been a melting pot of diverse human streams, making it a highly multi-ethnic nation.

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shrubs that are adapted to survive in conditions of chronic water scarcity and intense solar radiation.

86. (A) Both A and R are true and R is the correct explanation of A.
The eastern coast of India is highly vulnerable to tropical cyclones that originate in the Bay of Bengal. These storms are fueled by the high sea surface temperatures prevalent in the region. The Bay of Bengal is a major breeding ground for tropical depressions, which can intensify into severe cyclonic storms. As they move toward the land, these cyclones bring heavy rain and strong winds, causing significant damage to coastal communities and infrastructure. This makes disaster preparedness essential for the eastern states.

87. (D) A diversification of the industrial base from traditional to modern industries.
Since independence, the pattern of industrial development in India has undergone a significant transformation. The country has moved away from a narrow reliance on traditional industries like textiles and food processing. There has been a successful diversification of the industrial base into modern sectors such as chemicals, automobiles, electronics, and information technology. This shift has been supported by government policies and technological advancements, leading to a more robust and varied industrial economy that can cater to both domestic and international markets.

88. (A) Alluvial Soil
Alluvial soil is the most widespread and productive soil type in India, covering a large portion of the Northern Plains and the coastal regions. It is formed by the deposition of silt and sediment brought down by major river systems like the Ganga and Brahmaputra. This soil is rich in minerals and possesses a high level of fertility, making it ideal for the cultivation of various crops like wheat, rice, and sugarcane. Its presence has historically supported high population densities.

89. (C) The number of females per 1000 males.
The sex ratio is a fundamental demographic indicator used to measure the gender balance within a population. It is formally defined as the number of females per every one thousand males in a given area. This ratio provides valuable insights into the social status of women and the prevailing gender dynamics in a society. In India, the sex ratio has historically been skewed, and monitoring it is crucial for formulating policies aimed at gender equality and improving the welfare of the female population.

90. (A) (ii), (iv), (i), (iii)
The Himalayan mountain system is organized into several parallel ranges that follow a specific north-to-south arrangement. The Karakoram Range is the northernmost, followed by the Zaskar Range. Further south lies the Pir Panjal Range, which is part of the Lesser Himalayas. Finally, the Shiwalik Range forms the southernmost and youngest part of the system, bordering the northern plains. This sequence reflects the geological evolution and the varied elevations of the different mountain belts within the vast Himalayan region.

91. (D) The dominant role of the agricultural sector in exports.
Globalisation in India has been driven by multiple factors, including rapid advancements in information technology and the liberalisation of trade policies. The growth of multinational corporations has also played a crucial role in integrating the Indian economy with global markets. However, while agriculture remains a significant part of the economy, it has not been a major driver of the globalization process in the same way that the industrial and service sectors have. Instead, exports are now dominated by manufactured goods and high-tech services.

92. (B) New, fertile alluvium deposited annually in floodplains.
The Northern Plains are divided into different regions based on the nature and age of the alluvial deposits. Khadar refers to the newer alluvium that is deposited annually by rivers during the flood season. This soil is very fine, light in color, and exceptionally fertile. Because it is renewed every year, it remains highly productive and is extensively used for intensive agriculture. It is primarily found in the floodplains and deltaic regions of the major river systems like the Ganga.

93. (C) (a), (b), and (d)

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for industrial purposes rather than for direct consumption. It is classified as a non-food or commercial crop. Its cultivation is concentrated in specific tropical regions of South India with high rainfall.

64. (A) (a), (b), and (d) only
The Green Revolution transformed Indian agriculture through the introduction of various modern inputs. Technological factors in this context refer to the scientific and mechanical advancements applied to farming. These include the use of high-yielding variety seeds, the expansion of modern irrigation facilities, and the increased application of chemical fertilizers and pesticides. While land consolidation and agricultural credit are important, they are considered institutional and economic factors rather than direct technological improvements aimed at increasing crop productivity and yields.

65. (B) Kosi
The Kosi river, a major tributary of the Ganga, is notorious for its unpredictable behavior and frequent course changes. During the monsoon season, the river carries a massive volume of water and silt from the Himalayas. This leads to severe and widespread flooding in the plains of Bihar, causing immense destruction of life, property, and agricultural land. Because of its recurrent and devastating impact on the region, it is often referred to as the 'Sorrow of Bihar'.

66. (A) Both Statement I and Statement II are true.
The educational profile of the Indian population reveals significant progress in literacy rates over the decades. However, there remain substantial disparities between males and females, with male literacy generally being higher. To address this gender gap and promote female education, the government has launched various targeted initiatives. Programs like 'Beti Bachao, Beti Padhao' aim to improve the social status of girls and ensure their access to quality education, thereby fostering a more balanced and inclusive society.

67. (C) All of the above, reflecting a complex web of exchanges.
Internal trade in India is characterized by a complex and extensive network of exchanges between different states and regions. This trade involves the movement of agricultural products from surplus regions to deficit and industrial areas. Simultaneously, minerals and raw materials flow from resource-rich states, particularly in the east, to manufacturing hubs across the country. This web of trade reflects the economic interdependence of various regions and is facilitated by the country's diverse resource base and growing transport infrastructure.

68. (D) Godavari
The Godavari is the largest river system in Peninsular India and is often referred to as the 'Dakshin Ganga'. It originates in the Western Ghats of Maharashtra and flows eastward across the plateau before draining into the Bay of Bengal. Its basin covers parts of several states, including Maharashtra, Telangana, and Andhra Pradesh. Due to its significant length, large catchment area, and the volume of water it carries, it possesses the largest river basin among all peninsular rivers.

69. (B) (i), (iii), (ii), (iv)
The Indian monsoon follows a rhythmic progression across the subcontinent. It typically begins with a sudden onset over the Kerala coast in early June. From there, it gradually advances to cover the entire country by mid-July. After several months of rain, the withdrawal process starts from northwestern India in September. Finally, the monsoon retreats completely from the peninsular tip by December. This seasonal cycle dictates the agricultural calendar and the overall climate of the various regions of India.

70. (A) Both A and R are true and R is the correct explanation of A.
Despite several decades of regional development planning, India still faces significant disparities in the levels of development between different states and regions. While plans are formulated with the goal of balanced growth, their implementation is often hindered by various challenges. These include a lack of adequate funding, fluctuating political will, and difficulties in administrative coordination across different levels of government. Addressing these hurdles is essential for ensuring that the benefits of national economic growth are distributed more equitably across the country.

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25. (C) Guiding the path of western disturbances into India.
The sub-tropical westerly jet stream is a high-altitude wind current that prevails over the northern parts of India during the winter. This jet stream plays a crucial role in the regional climate by steering atmospheric disturbances. It guides the western disturbances, which originate over the Mediterranean Sea, into the northwestern parts of the Indian subcontinent. These disturbances bring essential winter rainfall to the plains and snowfall to the Himalayan region.

26. (A) Rubber - Punjab and Haryana
Natural rubber is a tropical crop that requires high temperatures and heavy, well-distributed rainfall throughout the year. In India, the environmental conditions suitable for rubber cultivation are found in the southern states like Kerala and parts of Tamil Nadu. Punjab and Haryana, with their semi-arid to sub-humid climates and extreme temperature variations, are not suitable for rubber production. These northern states are instead major producers of wheat and rice.

27. (B) P-3, Q-4, R-1, S-2
Natural disasters in India are geographically specific due to the country's diverse physical features. The Himalayan region is highly prone to seismic activity and earthquakes. The Ganga-Brahmaputra plains frequently experience devastating floods due to heavy monsoon rains. Arid regions like Rajasthan and parts of Rayalaseema are susceptible to chronic droughts. Meanwhile, the Eastern Coastal Plains are vulnerable to tropical cyclones originating in the Bay of Bengal due to high sea temperatures.

28. (B) Agriculture, forestry, and fishing
The occupational structure of an economy is divided into different sectors based on the nature of the activities. The primary sector involves the direct extraction and use of natural resources. This includes activities such as agriculture, forestry, fishing, and mining. In India, a significant portion of the workforce is still engaged in this sector, although its contribution to the national income has been decreasing relative to the secondary and tertiary sectors over time.

29. (C) Fragmented and small land holdings.
Agricultural productivity in India is hindered by various institutional constraints related to land management. One major issue is the presence of fragmented and small landholdings, which results from traditional inheritance laws. Small plot sizes make it difficult for farmers to adopt modern machinery, implement efficient irrigation systems, or achieve economies of scale. This fragmentation leads to wastage of land and labor, ultimately reducing the overall efficiency and profitability of the farming sector.

30. (D) A dry spell of several days during the rainy season.
The Indian monsoon is not a continuous phenomenon but is characterized by periods of rainfall followed by dry intervals. A 'break' in the monsoon refers to a dry spell lasting for several days or weeks during the rainy season. This occurs when the monsoon trough shifts its position or when atmospheric conditions become unfavorable for cloud formation. These breaks significantly impact agricultural activities and the overall water distribution across different regions of the country.

31. (A) The Central Highlands
India is traditionally divided into several major physiographic units based on geological structure and surface features. These include the Northern Mountains, the Northern Plains, the Peninsular Plateau, the Coastal Plains, and the Islands. While the Central Highlands are a distinct geographical entity, they are technically considered a sub-division of the vast Peninsular Plateau. Therefore, they are not listed as one of the primary first-order physiographic divisions of the Indian landmass.

32. (B) Ganga carries a heavy sediment load, while Narmada flows through a rift valley.
The formation of coastal features depends on the sediment load and the topography of the river's course. The Ganga carries a massive amount of silt and flows over a gentle slope, allowing it to deposit sediments and form a large delta. In contrast, the Narmada flows through a steep rift valley with high velocity. The lack of extensive floodplains and the high energy of the river prevent sediment deposition, leading to an estuary.

Black soil is known for its exceptional water retention capacity. Laterite soil is formed in tropical regions through intense leaching due to heavy rainfall. Red soil is often deficient in lime, magnesia, and phosphates but covers large parts of the peninsula. Understanding these differences is essential for regional agricultural planning and crop selection.

79. (A) It is an example of an inland drainage system, disappearing into the sands of the Rann of Kutch. The Luni is a unique river in India as it belongs to an inland drainage system. It originates in the Aravalli range near Ajmer and flows through the semi-arid regions of Rajasthan. Unlike most other rivers that eventually reach the sea, the Luni does not drain into any large water body. Instead, it flows toward the southwest and gradually disappears into the marshy sands of the Rann of Kutch. Its water is initially fresh but becomes increasingly saline along its course.

80. (B) Anthropogenic activities like road construction and deforestation.
The susceptibility of the Himalayan region to natural disasters is often exacerbated by human activities. Rapid road construction, deforestation, and unplanned urbanization on steep slopes destabilize the fragile terrain. These anthropogenic factors increase the frequency and intensity of highland hazards like landslides and floods. When natural triggers like heavy rainfall or seismic events occur, the impact is much more severe due to the compromised environment. Managing these human-induced pressures is critical for reducing the disaster risk in the high-altitude regions of India.

81. (B) National GDP
Population composition refers to the internal characteristics of a population that help in its analysis and comparison. Major determinants include age, sex, literacy, rural-urban residence, and occupational structure. These attributes provide insights into the social and economic health of a country. While the national GDP is an important indicator of overall economic performance, it is not considered a direct component of the population's composition itself. Instead, it is a macroeconomic variable that is influenced by various demographic and industrial factors.

82. (A) Anai Mudi
The Peninsular Plateau of India features several mountain ranges and peaks. Anai Mudi, located in the Anaimalai Hills of Kerala, is the highest peak in this entire region. It stands at an elevation of approximately 2,695 meters above sea level. This peak is also the highest point in South India. It is a significant geographical landmark and forms part of the Western Ghats. Its presence influences the local climate and supports a variety of high-altitude flora and fauna.

83. (A) (a), (b), and (c) and (d) only
The Green Revolution brought about fundamental changes in Indian agriculture. It successfully made the country self-sufficient in food grains, particularly wheat and rice. However, the benefits were not uniform across all regions or among all farmers. It led to increased inter-regional disparities, as areas with assured irrigation benefited more. Additionally, the intensive use of chemical inputs caused environmental issues like soil degradation and groundwater depletion. While it boosted overall production, it often failed to ensure equitable benefits for smaller, less resourceful farmers.

84. (A) Both Statement I and Statement II are true.
India possesses a long coastline that stretches along the Arabian Sea and the Bay of Bengal, providing significant advantages for international trade. However, the physical nature of the coastline varies. The western coast is generally more indented with natural harbors. In contrast, the eastern coast is relatively smooth and lacks many natural, deep-water ports. This smoothness is partly due to the extensive deposition of sediment by major rivers. These geographical features influence the development of port infrastructure and the direction of maritime trade.

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85. (C) Arid or Desert Climate (BWhw)
The arid or desert climate, categorized as BWhw, is primarily found in the western parts of India, including Rajasthan and northern Gujarat. This climatic zone is characterized by extremely high temperatures during the hot summer and cool, dry winters. Rainfall is very scanty and highly unreliable, often falling below 25 centimeters annually. The vegetation in such regions is sparse, consisting mainly of thorny bushes and

contrast, the eastern coast receives less rain from this branch because it lies in the rain-shadow area or is influenced by the Bay of Bengal branch later.

41. (C) Polymetallic nodules
The vast Indian coastline and the surrounding exclusive economic zone offer immense potential for marine resource extraction. Among these, polymetallic nodules found on the deep ocean floor are highly significant. These nodules are rich in various valuable minerals such as manganese, nickel, cobalt, and copper. India has been granted exploration rights in the Central Indian Ocean Basin to tap into these resources, which could support future industrial needs and enhance national mineral security.

42. (A) Reduce regional disparities and ensure balanced socio-economic development.
In a geographically and economically diverse country like India, growth is often concentrated in specific pockets. The primary goal of regional development planning is to reduce these disparities between different states and regions. By implementing targeted schemes and infrastructure projects in backward areas, the government seeks to ensure balanced socio-economic development. This approach aims to provide equal opportunities for all citizens and prevent the excessive concentration of resources and population in a few metropolitan centers.

43. (B) P-4, Q-3, R-1, S-2
The drainage system of India consists of major rivers and their numerous tributaries. The Chambal is a significant tributary of the Yamuna, which itself joins the Ganga. The Tungabhadra flows through the southern peninsula as a major tributary of the Krishna. The Manas is an important northern tributary of the Brahmaputra in Assam. Finally, the Son river originates in the central highlands and flows north to join the Ganga as a right-bank tributary.

44. (B) Tsunami
The Himalayan region is characterized by high altitudes, steep slopes, and geological instability. This environment is prone to several highland hazards, including landslides, snow avalanches, and glacial lake outburst floods. These events are often triggered by seismic activity or extreme weather. However, a tsunami is a marine hazard caused by undersea earthquakes or volcanic eruptions. Since the Himalayas are landlocked mountains, they are not susceptible to tsunamis, which primarily affect coastal regions.

45. (C) Bihar
Population density is a measure of the number of persons per unit area, reflecting the pressure on land. According to the 2011 census, Bihar emerged as the most densely populated state in India, surpassing West Bengal. Factors such as fertile alluvial soil, availability of water from perennial rivers, and a flat landscape have traditionally supported high population concentrations in this region. This high density poses significant challenges for resource management, infrastructure development, and overall socio-economic planning.

46. (C) (a), (b), and (e) only
The Peninsular Plateau is one of the oldest and most stable geological blocks on the Earth's surface. It is primarily composed of ancient crystalline, igneous, and metamorphic rocks that have withstood tectonic movements over millions of years. The landscape is characterized by broad, shallow valleys and rounded hills, indicating a mature stage of erosion. Unlike the Himalayas, this region lacks active volcanoes and is generally considered a stable zone with low frequency of high-intensity earthquakes.

47. (A) Availability, accessibility, and affordability of food to all people.
Food security is a multi-dimensional concept that goes beyond mere production. In the Indian context, it ensures that all people have physical and economic access to sufficient, safe, and nutritious food at all times. This involves three essential components: availability through domestic production or imports, accessibility to every individual, and affordability for the common man. The government implements various schemes and laws to address these aspects and protect vulnerable populations from hunger and malnutrition.

48. (B) The Coriolis force deflecting the southeast trade winds after they cross the equator.
The southwest monsoon winds originate as southeast trade winds in the Southern

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National waterways are an important part of India's transport infrastructure, offering an energy-efficient and environment-friendly mode of movement. NW-1 is located on the Ganga river, while NW-2 covers the Brahmaputra river. These waterways are crucial for regional connectivity and freight transport. However, inland waterways are not yet a dominant mode of transport in India compared to railways and roadways. Their development faces challenges such as seasonal variations in water levels and the diversion of river water for irrigation and other purposes.

94. (D) Hindus
India is a land of immense religious diversity, with several major faiths coexisting for centuries. According to the data provided by the 2011 Census, Hindus constitute the largest religious group in the country, making up a significant majority of the total population. Muslims form the second largest religious community. Other prominent groups include Christians, Sikhs, Buddhists, and Jains. This multi-religious composition is a key feature of India's social fabric and is reflected in the nation's various cultural and historical traditions.

95. (B) P-3, Q-2, R-1, S-4
The distribution of natural resources in India is closely linked to its geological structure. Iron ore is found in major belts like the Odisha-Jharkhand region. Petroleum is extracted from offshore fields such as Mumbai High and inland areas. Bauxite, the ore for aluminum, is concentrated in plateaus like Amarkantak. Perennial rivers, a vital water resource, are primarily fed by the glaciers of the Himalayan region. Understanding these patterns of occurrence is essential for the planning and development of mineral-based and water-dependent industries.

96. (B) Soil salinization and waterlogging from irrigation.
While the Green Revolution significantly increased food production, it also led to several negative environmental consequences. The intensive use of canal irrigation in regions like Punjab and Haryana has resulted in problems like soil salinization and waterlogging. These issues occur when excess water brings underground salts to the surface or when the water table rises too high, damaging the soil quality and reducing crop yields over time. This highlights the need for more sustainable and ecologically balanced agricultural practices in modern farming.

97. (B) Software and IT industry
A footloose industry is one that is not tied to a specific location by the presence of raw materials or heavy transport costs. These industries can be established in a wide variety of places, often depending on factors like the availability of skilled labor and communication networks. The software and information technology industry is a classic example of a footloose industry. Unlike steel or cement plants, IT firms do not need to be near mines and can operate from any urban center with good infrastructure.

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98. (B) Both Statement I and Statement II are true, but are independent statements.
Drought is a unique type of natural hazard characterized by its slow onset and prolonged duration. It occurs when a region experiences a significant deficiency in precipitation over an extended period, leading to a shortage of water for various needs. While the primary cause is meteorological, the impact of a drought is widespread, affecting agriculture, livestock, and the overall socio-economic health of a community. Because it develops gradually, its onset is often difficult to pinpoint compared to sudden disasters like floods.

99. (C) A broad base and a tapering top, indicating a youthful and growing population.
The age-sex pyramid is a graphical representation of a population's age and gender structure. India's pyramid is characterized by a broad base and a tapering top. This shape indicates that a high proportion of the population is in the younger age groups, reflecting high birth rates in the recent past. As the age increases, the number of people decreases, creating the tapering effect. This structure suggests a youthful and growing population, which presents both opportunities for a demographic dividend and challenges for providing employment.

100. (A) Both A and R are true and R is the correct explanation of A.
The drainage systems of India reflect the diverse geological history of the subcontinent. The peninsular drainage system is significantly older

than the Himalayan system. This is because the Peninsular Plateau is a geologically ancient and stable landmass that has been exposed for millions of years. In contrast, the Himalayas are young fold mountains that formed much later due to tectonic collisions. Consequently, the rivers of the peninsula have reached a mature stage, while Himalayan rivers are still active and youthful in their erosional activities.

101. (C) Mount Everest - Himachal Pradesh
The Himalayan mountain system contains many of the world's highest peaks, which are distributed across different countries and Indian states. Kanchenjunga is located on the border between India and Nepal, primarily in Sikkim. Nanga Parbat is situated in Jammu and Kashmir, while Nanda Devi is a prominent peak in Uttarakhand. However, Mount Everest, the world's highest peak, is located in the Great Himalayas on the border between Nepal and Tibet, not in the state of Himachal Pradesh.

102. (D) All (a), (b), (c), (d), and (e) are correct.
The mechanism of the Indian monsoon is a complex interplay of several atmospheric and geographical factors. These include the differential heating of land and water, the seasonal shift of the Inter-Tropical Convergence Zone, and the intense heating of the Tibetan plateau. Additionally, the presence of high-pressure systems and the movement of the westerly and easterly jet streams play crucial roles in driving the monsoon winds. Together, these phenomena create the rhythmic and predictable patterns of rainfall that characterize the Indian climate.

103. (D) Shifting cultivation
Shifting cultivation is an ancient form of agriculture still practiced by several tribal communities in the hilly regions of Northeast India. In this system, a patch of forest is cleared by felling and burning trees, and crops are grown for a few years until the soil fertility declines. The area is then abandoned for a new plot, allowing the old forest to regenerate. Locally, this practice is known as 'Jhum cultivation' and is a form of subsistence farming adapted to the local environment.

104. (A) Third Five-Year Plan
In the early decades of planning in India, the focus was primarily on national economic growth and industrialization. However, it soon became evident that different regions were progressing at different rates. The Third Five-Year Plan was significant because it explicitly recognized the need to address regional imbalances as a major objective. It emphasized the importance of ensuring that the benefits of development are spread more evenly across all parts of the country, leading to the formulation of various regional and backward area development programs.

105. (C) Unmet needs for contraception and health care.
The National Population Policy of 2000 was designed to provide a holistic approach to population stabilization in India. One of its primary and most immediate objectives was to address the unmet needs for basic reproductive and child healthcare services. This included ensuring the availability of contraception and improving healthcare infrastructure to reduce maternal and infant mortality. By focusing on these critical health and social needs, the policy aimed to empower individuals and families to make informed choices, eventually leading to a stable population.

106. (A) Tropical Deciduous Forests
Natural vegetation in India is largely determined by the distribution of rainfall. Tropical deciduous forests are the most widespread type in the country. A key characteristic of these forests is that the trees shed their leaves for about six to eight weeks during the dry summer season to conserve moisture. These forests are further divided into moist and dry deciduous based on the amount of rainfall they receive. Teak, sal, and shisham are some of the dominant tree species found in this vegetation type.

107. (D) Reduced water flow due to diversion for irrigation.
The development of internal waterways in India offers a sustainable alternative for transport but faces several hurdles. A major challenge is the inconsistent water flow in many rivers throughout the year. This problem is exacerbated by the large-scale diversion of river water for irrigation, industrial use, and urban needs. These diversions reduce the depth and navigability

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of the river channels, especially during the dry season. Addressing these water management issues is essential for creating a viable and efficient national network of inland waterways.

108. (B) The distribution of the working population across different sectors of the economy.
The occupational structure is an important demographic attribute that shows how the working population of a country is distributed across various economic activities. It is generally classified into three main sectors: primary, which includes agriculture and resource extraction; secondary, which involves manufacturing and construction; and tertiary, which covers services and trade. Analyzing this structure helps in understanding the level of economic development and the shifting patterns of employment in a nation as it moves from a traditional to a more modern economy.

109. (C) The Durg-Bastar-Chandrapur belt in Chhattisgarh.
India is home to several major iron ore belts that provide the raw material for its steel industry. The Durg-Bastar-Chandrapur belt, located primarily in Chhattisgarh and Maharashtra, is one of the most significant. This region contains very high-grade hematite ore, which is found in the famous Bailadila hills. This ore is highly valued for its quality and is both used domestically in steel plants and exported to countries like Japan and South Korea through the Visakhapatnam port.

110. (A) Both Statement I and Statement II are true.
India's island groups have distinct geological origins. The Andaman and Nicobar Islands, located in the Bay of Bengal, are of volcanic origin and represent the elevated portions of a submerged mountain range. They are characterized by hilly terrain and thick tropical forests. In contrast, the Lakshadweep Islands in the Arabian Sea are of coral origin. These islands are small, flat, and surrounded by lagoons and reefs. Together, these two island groups add to the geographical diversity and strategic importance of the Indian subcontinent.

111. (A) The interior Deccan Plateau in Maharashtra and Karnataka
The Western Ghats play a critical role in the distribution of rainfall in Peninsular India. During the southwest monsoon, the moisture-laden winds are blocked by these mountains, causing heavy rain on the windward western coast. As the air moves over the mountains and descends on the other side, it becomes warmer and loses its ability to cause precipitation. This creates a rain-shadow effect in the interior Deccan Plateau, particularly in parts of Maharashtra and Karnataka, which receive significantly lower rainfall.

112. (A) (i), (ii), (iii), (iv)
The distribution of India's population is highly uneven among its states. According to the 2011 Census data, Uttar Pradesh remains the most populous state by a significant margin. It is followed by Maharashtra, which has the second largest population. Bihar and West Bengal rank third and fourth, respectively. This ranking reflects various historical, environmental, and socio-economic factors that have led to high population concentrations in these regions. These states together account for a very large proportion of the total national population.

113. (A) Both A and R are true and R is the correct explanation of A.
While the Green Revolution increased overall agricultural production, it also had significant social consequences. The new technology, which involved high-yielding variety seeds and chemical inputs, required substantial financial investment. In the initial stages, only large and resourceful farmers could afford these expensive inputs and the associated irrigation costs. Consequently, they reaped the most benefits, leading to a widening income gap between rich and poor farmers. This highlighted the need for more inclusive policies that provide support and credit to small and marginal farmers.

114. (A) Petrochemicals, textiles, and pharmaceuticals
The Gujarat industrial region is one of the most dynamic and diversified economic hubs in India. It is well-known for several major industrial clusters that have grown due to favorable policies and port connectivity. Key sectors in this region include petrochemicals and petroleum refining, which are centered around major refineries. The state is also a leader in the textile industry, particularly cotton, and has a strong presence in pharmaceuticals and chemicals. This industrial

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The study of population composition is a specialized branch of demography that focuses on the qualitative attributes of a population. Rather than just looking at the total number of people, it examines various internal characteristics that define a society. These include the distribution of individuals by age and sex, literacy levels, and the types of occupations they are engaged in. It also looks at factors like religious and linguistic diversity. This analysis is essential for understanding the social structure and economic potential of a country and for formulating targeted policies.

157. (A) (a), (b), and (c)
The physiography of India is defined by three main geological units that have distinct origins and characteristics. The Himalayas are young fold mountains formed by recent tectonic activity. The Peninsular Plateau is an ancient and stable landmass composed of old crystalline and igneous rocks. The Northern Plains are the result of extensive alluvial deposition by major river systems. However, the coastal plains are primarily a product of marine and riverine depositional and erosional processes, rather than volcanic activity, which is a feature limited to specific parts of the peninsula.

158. (D) Burst of the monsoon
The arrival of the southwest monsoon over the Indian subcontinent is often marked by a sudden and dramatic change in weather conditions. After a period of intense summer heat and low pressure, the moisture-laden winds arrive with heavy rainfall, thunder, and lightning. This abrupt onset is commonly referred to as the 'burst' of the monsoon. It typically occurs first over the Kerala coast and signals the beginning of the rainy season. This event provides immediate relief from the summer heat and is crucial for starting the kharif sowing season.

159. (A) Both A and R are true and R is the correct explanation of A.
A robust and well-developed transport network is a fundamental requirement for the regional development of any country. Transport systems, including roads, railways, and waterways, facilitate the efficient movement of goods, raw materials, and people between different areas. This connectivity is essential for promoting trade, encouraging industrialization, and ensuring that economic benefits are spread more widely. Furthermore, a good transport network fosters socio-economic integration by linking remote and backward regions with major economic centers, thereby reducing disparities and improving the overall quality of life for the population.

160. (B) The olive and citrus fruit region spanning the entire country.
India is divided into several major crop regions based on the suitability of climate and soil for specific types of agriculture. The rice-jute-tea region is prominent in the east and northeast, while the wheat and sugarcane region dominates the north and northwest. The cotton and coarse grains region is characteristic of the western and Deccan plateau. However, there is no major crop region defined by olives and citrus fruits that spans the entire country. Such crops are typically grown in specific Mediterranean climates or localized hilly areas in India.

161. (B) Initial increase in river flow followed by a long-term decrease.
The Himalayan cryosphere serves as a vital water reservoir, feeding perennial rivers that sustain millions of people in North India. Climate change is causing these glaciers to recede at an accelerated pace. Initially, the increased melting of ice may lead to a temporary rise in the volume of river water and potentially more frequent flooding. However, in the long term, the depletion of the glaciers will result in a significant decrease in the water supply. This poses a severe threat to water security, agriculture, and the overall ecological balance of the entire region.

162. (A) The way people are spread out over the earth's surface.
The term 'spatial pattern of distribution' is a geographical concept used to describe how people are spread out across a given territory. It examines the arrangement of the population over the Earth's surface and identifies areas of high, moderate, and low density. This pattern is influenced by various factors, including the availability of natural resources, climate, topography, and the history of human settlement. Analyzing the spatial distribution is essential for understanding the pressure on land and

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122. (A) The eastern and southern parts of the Deccan Plateau
Red soils are a prominent soil type in the Peninsular Plateau of India. They develop on ancient crystalline igneous rocks, particularly in regions that receive low rainfall. The color is derived from the wide diffusion of iron in the rocks. These soils are primarily found in the eastern and southern parts of the Deccan Plateau, covering large areas of states like Tamil Nadu, Karnataka, and Andhra Pradesh. While they are generally less fertile than alluvial or black soils, they can support agriculture with proper irrigation and fertilization.

123. (D) Kerala and Karnataka
Toward the end of the summer season, parts of South India experience pre-monsoon showers. In the states of Kerala and Karnataka, these rains are popularly known as 'Mango Showers' because they are extremely beneficial for the early ripening of the mango crop. These showers are localized weather phenomena and signal the approaching monsoon. They provide much-needed relief from the intense summer heat and play an important role in the local agricultural cycle, particularly for fruit growers and farmers in these coastal and inland regions.

124. (B) Increased regional disparities in development
One of the major criticisms of the Green Revolution in India is its impact on regional development. The new agricultural strategy was most successful in areas with assured irrigation facilities and better infrastructure, such as Punjab, Haryana, and western Uttar Pradesh. In contrast, many other parts of the country, particularly rain-fed and backward regions, did not experience the same level of growth. This led to an increase in inter-regional and intra-regional disparities, as some areas progressed rapidly while others lagged behind, creating significant economic and social imbalances.

125. (A) Both Statement I and Statement II are true, and Statement II is an effect of Statement I.
The policy shift toward globalisation has significantly altered the landscape of the Indian economy. It has facilitated an increased flow of international capital and advanced technology into the country. This integration has been a key factor in the rapid growth of modern service-oriented sectors. Specifically, the information technology (IT) and business process outsourcing (BPO) industries have expanded tremendously, driven by global demand and the availability of a skilled workforce. These sectors have become major contributors to India's GDP, exports, and urban employment opportunities.

126. (D) The question premise is flawed; railways do not cross the high Himalayas in such a manner.
The construction of railways in high-altitude mountain regions faces immense engineering challenges due to steep gradients and unstable terrain. While India has developed several impressive mountain railways, such as the Darjeeling Himalayan Railway and the Kalka-Shimla line, these operate in the Lesser Himalayas and foothills. No railway line currently crosses the high, snow-capped ranges of the Greater Himalayas through passes like Zoji La or Nathu La. Therefore, the idea that a railway line passes through these extremely high passes is geographically and technically incorrect.

127. (A) Tin
India possesses a diverse range of mineral resources that support its industrial and economic growth. The country has significant reserves of high-grade iron ore and extensive coal fields that fuel its power plants and steel mills. Bauxite is also abundantly available for the aluminum industry. However, tin is one of the minerals in which India is significantly deficient. There are very few known and commercially viable deposits of tin in the country, and most of the national requirement is met through imports from other nations.

128. (A) (a), (b), (c), and (d) only
The Green Revolution was a turning point for Indian agriculture, primarily because it achieved national self-sufficiency in food production. This was possible through the use of high-yielding seeds and modern inputs, which particularly benefited wheat-growing areas. However, the movement also had drawbacks. It led to increased regional and social disparities and caused several environmental problems, such as soil degradation and the depletion of groundwater. Furthermore, the benefits were often not equitably distributed, with large farmers gaining more than their smaller, less resourceful counterparts.

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diversity has made Gujarat a major contributor to the national GDP and external trade.

115. (C) Widespread losses exceeding community coping capacity.
A natural disaster is an extreme event caused by natural forces that results in widespread human, material, or environmental losses. It is distinguished from a natural hazard by its impact on society. A disaster is declared when the scale of the event exceeds the ability of the affected community or society to cope using its own resources. These events disrupt normal functioning and require external assistance for recovery. They are not merely seasonal changes or predictable environmental fluctuations but are sudden or slow-onset crises.

116. (A) P-4, Q-1, R-2, S-3
Agricultural statistics use several specific terms to measure production and efficiency. Yield refers to the output per unit of land for a specific crop, while production is the total quantity of a commodity produced. Productivity is a broader measure of output per unit of any factor of production, most commonly land. Cropping intensity is the ratio of the gross cropped area to the net sown area, indicating how many times a piece of land is cultivated in a year. Understanding these terms is essential for analyzing agricultural performance.

117. (C) A dominant share of capital goods, raw materials, and petroleum.
The composition of India's imports reflects its industrial and energy needs. A dominant and consistent portion of the import bill is accounted for by petroleum, oil, and lubricants (POL), which are essential for the transport and power sectors. Additionally, capital goods like machinery and raw materials for various industries make up a significant share. Unlike the early decades after independence, India now imports relatively small quantities of food grains. This composition highlights the country's dependence on external energy sources and its ongoing efforts toward industrial modernization.

118. (B) The increase in the number of inhabitants of a territory during a specific period.
Population growth is a fundamental demographic concept that refers to the change in the number of inhabitants of a particular territory over a specific period. This change can be measured in absolute numbers or as a percentage rate. It is influenced by three main factors: the birth rate, the death rate, and the net migration. Understanding growth patterns is crucial for planning infrastructure, healthcare, and educational facilities. A rapid increase in population can put significant pressure on natural resources and the existing social and economic systems.

119. (A) (a), (b), and (d)
The drainage systems of India are categorized into Himalayan and Peninsular rivers based on their origin and characteristics. The Godavari is indeed the largest river system in the peninsula. The Indus originates in the Tibetan plateau near Lake Manasarovar. The Brahmaputra enters India in Arunachal Pradesh as the Dihang. However, the Narmada and Tapi are notable west-flowing rivers, not east-flowing. These rivers are perennial or seasonal and flow through diverse landscapes, playing a vital role in the economy and ecology of the different regions.

120. (A) All of the above
India is blessed with diverse water resources that are essential for its large population and agricultural needs. These resources include surface water found in numerous rivers, lakes, and ponds, as well as groundwater stored in underground aquifers. Additionally, the long coastline features several lagoons and backwaters, which are important for fishing and transport. Efficient management of all these water sources is critical for ensuring water security and supporting the sustainable development of both rural and urban areas across the entire country.

121. (C) 1951-1981
The demographic history of India is divided into different phases based on birth and death rates. The period between 1951 and 1981 is known as the phase of population explosion. During this time, the country experienced a very high growth rate due to a rapid decline in the death rate, thanks to improved healthcare and sanitation. Meanwhile, the birth rate remained consistently high. This imbalance between falling mortality and high fertility led to a massive increase in the absolute number of people in the country.

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The National Food Security Act of 2013 is a landmark piece of legislation that changed the approach to food security in India. It made the provision of subsidized food grains a legal entitlement for a large majority of the population. The act also includes specific provisions for nutritional support for pregnant women, lactating mothers, and young children. However, the act focuses on the distribution of essential staples like rice, wheat, and coarse grains through the public distribution system. It does not contain any guarantee or mandate for providing organic food.

137. (C) Age composition
Age composition is a vital demographic characteristic that divides a population into different age groups. This classification is used to understand the economic potential and dependency within a society. Specifically, it allows for the categorization of the population into 'working' and 'non-working' or dependent groups. The working group typically includes adults who contribute to the economy, while children and the elderly are considered dependents. This distinction is crucial for planning services like education and healthcare and for assessing the overall burden on the productive workforce of a nation.

138. (A) P-4, Q-1, R-2, S-3
India has developed several major multipurpose river valley projects to manage its water resources for irrigation and power generation. The Bhakra-Nangal project is located on the Satluj river in northern India. The Hirakud dam, known for its immense length, is built across the Mahanadi in Odisha. The Nagarjuna Sagar project is a significant dam on the Krishna river in South India. Finally, the Sardar Sarovar dam is part of a large-scale project on the Narmada river in Gujarat, aimed at providing water to drought-prone regions.

139. (D) Landslide
The Himalayan region is highly susceptible to landslides, which are significant highland hazards. These events involve the sudden downward movement of rock, debris, or earth along a slope. They are often triggered by heavy monsoon rainfall that saturates the soil or by seismic activity in this tectonically active zone. Landslides pose a severe threat to human life, infrastructure, and transport networks in the mountains. Their impact is often exacerbated by human activities such as deforestation and road construction, which further destabilize the fragile slopes of the range.

140. (B) Many people are in non-working groups like children and the elderly.
The dependency ratio is a demographic indicator that compares the number of people in non-working age groups to the number of people in the productive, working-age group. A high dependency ratio implies that a large proportion of the population consists of children and the elderly who rely on the working population for support. This puts a significant economic burden on those who are employed and can affect national savings and investments in infrastructure and services. It is a key factor considered in socio-economic planning and social security policies.

141. (C) A state-controlled economy to a liberalized and market-oriented one.
The economic reforms of 1991 marked a fundamental shift in India's developmental strategy. Prior to these reforms, the Indian economy was characterized by heavy state control, extensive licensing, and protectionist trade policies. The new policy direction moved the country toward a more liberalized and market-oriented economy. This shift involved reducing government intervention, opening up various sectors to private and foreign investment, and integrating India more closely with the global economy. The aim was to boost efficiency, enhance competition, and accelerate economic growth through modernization and technological advancement.

142. (D) It is a pebble-studded zone where streams disappear underground.
Bhabar is a distinct physiographic belt located at the immediate foothills of the Shiwalik Range in the Northern Plains. It consists of a narrow strip of land composed of pebbles and gravel brought down by rivers from the mountains. A unique characteristic of this zone is its high porosity. Because of the coarse nature of the sediments, smaller streams and rivers often disappear underground as they enter the Bhabar belt. They

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129. (B) Fertility, mortality, and migration
The determinants of population mainly refer to the key demographic processes that directly influence population size and structure. These are fertility (birth rates), mortality (death rates), and migration (movement of people in or out of an area). Together, they determine population growth, decline, and distribution, unlike environmental or socioeconomic factors which affect population indirectly.

130. (A) Both A and R are true and R is the correct explanation of A.
The Hooghly industrial region, centered around Kolkata, is one of the oldest and most prominent industrial clusters in India. Its early development was facilitated by British colonial policies and the city's role as a major port. The region benefited from the proximity of the coal and iron ore fields of the Chota Nagpur plateau and a large supply of inexpensive labor from neighboring states. Historically, it became the heart of the jute industry and various engineering sectors, supported by an extensive transport and communication network.

131. (C) The network is highly dense and uniformly distributed across the country.
The Indian railway network is one of the largest in the world and plays a vital role in the country's transportation system. Since its introduction in 1853, it has grown extensively to connect major cities and industrial hubs. However, the distribution of the rail network is not uniform across the country. It is highly dense in the plains, where the terrain is flat and population density is high. In contrast, hilly regions and deserts have a much sparser network due to difficult topography and lower economic demand for rail transport.

132. (D) Steer the pace and pattern of industrial development in a country.
An industrial policy is a formal statement by the government that outlines its vision and strategy for the industrial sector. The primary objective of such a policy is to guide the pace and pattern of industrial development in the country. It defines the roles of the public and private sectors, regulates foreign investment, and provides incentives for specific industries. By setting clear goals and regulations, the policy aims to promote economic growth, create employment, and ensure that industrial development aligns with the nation's broader socio-economic priorities.

133. (A) (a), (b), and (c) only
India is prone to various natural hazards due to its diverse geography. The entire Himalayan region is a highly active seismic zone, making it extremely vulnerable to earthquakes. While the Deccan Plateau is generally more stable, it has experienced significant seismic events. Drought is another major hazard that, while triggered by meteorological factors, has deep socio-economic impacts on rural communities. However, cyclones primarily affect coastal areas rather than northern plains, and landslides are most common in mountainous regions like the Himalayas and Western Ghats, not the coastal plains.

134. (B) The wide diffusion of iron in crystalline and metamorphic rocks.
The distinctive color of red soil is a result of its chemical composition and the geological processes involved in its formation. These soils develop from the weathering of ancient crystalline and metamorphic rocks that are rich in iron. The widespread diffusion of iron in these rocks gives the soil its characteristic red hue. This color becomes particularly prominent when the iron exists in a hydrated form. Red soils cover a significant portion of the Peninsular Plateau and are found in regions with low to moderate rainfall.

135. (D) Water and Soil resources
Watershed management is a holistic approach to the conservation and sustainable use of natural resources within a specific drainage basin. The primary focus of this strategy is the integrated management of water and soil resources. By implementing measures like afforestation, soil conservation, and rainwater harvesting, it aims to prevent soil erosion and improve the availability of surface and groundwater. This approach is essential for enhancing agricultural productivity, protecting the environment, and ensuring the long-term water security of communities living within the watershed area.

136. (A) It guarantees the provision of organic food to all citizens.

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and Jains. This religious composition is a fundamental aspect of India's social diversity and has historically influenced various cultural and political aspects of the nation.

150. (A) Both Statement I and Statement II are true.
The rivers of the Peninsular Plateau are geologically much older than the Himalayan rivers. They have reached a mature stage of development, characterized by broad, shallow valleys and a graded profile. Because they flow over a hard, stable rock base and have a relatively low sediment load compared to Himalayan systems, these rivers exhibit stability in their courses. They do not frequently change their paths or cause significant course shifting. This stability is a key characteristic of the ancient drainage systems that dominate the southern part of India.

151. (D) The rhythm of seasons and the reversal of winds.
The climate of India is most famously characterized by the monsoon system, which involves a rhythmic change in the seasons. A fundamental feature of this system is the seasonal reversal of winds, which blow from the sea to the land in summer and from the land to the sea in winter. This reversal is accompanied by distinct changes in temperature and rainfall patterns. While there are regional variations, the overall rhythm of seasons and the influence of the monsoon winds are common and defining traits of the country's climate.

152. (A) Environmental, technological, and institutional factors.
Agricultural performance in India is not uniform but shows significant regional differences in terms of total production and productivity. These variations are primarily caused by a combination of three main factors. Environmental factors include differences in soil fertility, rainfall, and temperature. Technological factors refer to the varying levels of access to modern inputs like irrigation, high-quality seeds, and machinery. Institutional factors involve the differences in land tenure systems and the availability of credit. Together, these elements determine the agricultural potential and success of various regions.

153. (C) Rapid industrialisation focused on heavy industries and capital goods.
The Second Five-Year Plan, which spanned from 1956 to 1961, represented a major shift in India's developmental strategy. Under the influence of the Mahalanobis model, the plan prioritized rapid industrialization with a specific focus on heavy and basic industries. The government aimed to build a strong industrial foundation by investing in sectors like steel, chemicals, and machine tools. This strategy was based on the belief that developing a capital goods sector was essential for achieving long-term economic independence and sustainable growth for the newly independent nation.

154. (A) Port development and the availability of hydroelectricity.
The growth of the Mumbai-Pune industrial cluster can be attributed to several historical and geographical advantages. The early development of Mumbai as a major port city during the British period facilitated the import of machinery and the export of finished goods. The availability of hydroelectric power from the nearby Western Ghats provided a reliable energy source for industries. Historically, the region became a hub for the cotton textile industry, which laid the foundation for further diversification into sectors like chemicals, pharmaceuticals, and automobiles in the following decades.

155. (D) The KBK region of Odisha and parts of Rajasthan.
While drought can affect various parts of India, certain regions are particularly vulnerable due to low and unreliable rainfall. The KBK region of Odisha, which includes the districts of Kalahandi, Bolangir, and Koraput, is known for its chronic drought conditions and socio-economic challenges. Similarly, large parts of western and central India, including Rajasthan and northern Gujarat, frequently experience severe water scarcity. These areas have a high dependence on rain-fed agriculture, making them susceptible to the vagaries of the monsoon and recurrent droughts that impact livelihoods and food security.

156. (B) The attributes of the population such as age, sex, literacy, and occupation.

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eventually re-emerge further south in the marshy and swampy region known as the Terai.

143. (A) (a) and (b)
The Indian monsoon is driven by two main branches: the Arabian Sea branch and the Bay of Bengal branch. The Arabian Sea branch is generally more powerful and brings heavy rainfall to the western coast and parts of the peninsula. Meanwhile, the Coromandel coast on the eastern side receives a significant portion of its rainfall during the retreating monsoon season. The onset of the monsoon is actually quite sudden, not a gradual process. Furthermore, the Thar desert remains largely arid as the monsoon winds lose most of their moisture before reaching it.

144. (A) The monsoon winds.
India's climate is influenced by several factors, including its geography and latitudinal position. However, the most significant determinant is the seasonal rhythm of the monsoon winds. These winds undergo a complete reversal of direction during the year, dictating the patterns of temperature and precipitation across the entire subcontinent. The arrival and withdrawal of the monsoon define the seasons and have a profound impact on agriculture, water resources, and the overall lifestyle of the people. No other single factor influences the Indian climate as comprehensively as the monsoon.

145. (B) Both A and R are true but R is not the correct explanation of A.
India possesses a federal structure where power is divided between the center and the states. However, the country also exhibits a strong centralizing tendency, especially in economic and developmental matters. This is evident in regional development planning, which has traditionally been driven by central government initiatives, funding, and national-level planning bodies. While states play an important role in implementation, the overall direction and financial support often come from the center. Both the assertion and reason are true, reflecting the complex nature of India's federal and planning systems.

146. (A) Fish and other seafood
Marine resources are biological or mineral assets found in the oceans and coastal waters. Among the diverse biological resources, fish and other seafood are the most significant and widely utilized. They provide a vital source of protein and support the livelihoods of millions of people in coastal communities. India, with its extensive coastline and exclusive economic zone, has immense potential for the development of its fisheries sector. Other marine resources include minerals on the sea-bed and energy from tides, while coal and iron ore are terrestrial minerals.

NODIA

147. (C) The development of High Yielding Variety (HYV) seeds
The Green Revolution was a technology-driven movement that aimed to modernize Indian agriculture. A key technological breakthrough that spurred this revolution was the development and introduction of high-yielding variety (HYV) seeds, particularly for wheat and rice. These seeds were designed to be more responsive to chemical fertilizers and required assured irrigation. When combined with other modern inputs, they led to a dramatic increase in crop productivity and overall food production. This shift from traditional to scientific farming was the hallmark of the technological changes during this period.

148. (D) Porbandar
The National Highways Development Project includes the construction of major corridors to improve national connectivity. The East-West corridor is a key component of this project, designed to link the eastern and western parts of India. This corridor stretches from Silchar in the east, located in Assam, to Porbandar in the west, situated on the coast of Gujarat. Porbandar serves as the westernmost terminal point of this highway network. Its development is crucial for facilitating trade and the efficient movement of goods across the wide longitudinal extent of the country.

149. (C) Muslims
According to the demographic data from the 2011 Census of India, the country is home to several religious communities. While Hindus form the majority of the population, Muslims constitute the largest religious minority. In terms of absolute numbers and percentage share, they represent the second largest religious group in India after Hindus. Other significant minority groups include Christians, Sikhs, Buddhists,

resources and for planning the delivery of public services and infrastructure.

163. (A) P-3, Q-4, R-1, S-2
Demographic analysis uses several specific concepts to describe the characteristics of a population. Rural composition refers to the proportion of people living in villages compared to urban areas. Age composition shows the distribution of people across various age groups, which is important for understanding dependency. Sex composition is measured by the sex ratio, or the number of females per thousand males. Occupational composition indicates the percentage of the working population engaged in different sectors like agriculture, industry, and services. Each of these attributes provides a different lens for studying a nation's people.

164. (D) Tectonic activity lifting a submerged mountain range.
The Andaman and Nicobar Islands are a prominent archipelago in the Bay of Bengal with a distinct geological history. Their formation is the result of powerful tectonic activities. These islands are actually the elevated peaks of a submerged mountain range that was lifted above sea level due to the collision between the Indian and Eurasian tectonic plates. Unlike the coral-based Lakshadweep Islands, the Andaman and Nicobar chain is characterized by mountainous terrain and is geologically related to the young fold mountains of the nearby Southeast Asian mainland.

165. (C) Narmada
The Narmada is a significant river in central India that follows a unique geographical path. Unlike most peninsular rivers that flow eastward toward the Bay of Bengal, the Narmada flows westward. Its course is defined by a deep rift valley that was formed by the faulting of the Earth's crust. This valley is situated between the Vindhya Range to the north and the Satpura Range to the south. The river eventually empties into the Arabian Sea, and its flow through the hard rock of the rift valley creates many scenic waterfalls.

166. (B) Abolition of industrial licensing for most industries.
The Industrial Policy of 1991 introduced radical reforms to modernize and liberalize the Indian economy. One of its most significant and central features was the abolition of industrial licensing for a vast majority of industries. This move was intended to reduce government control, eliminate bureaucratic hurdles, and encourage entrepreneurship. By allowing private players more freedom to set up and expand industries without seeking prior government approval, the policy aimed to foster competition, improve industrial efficiency, and attract more domestic and foreign investment into the manufacturing sector and other key industries.

167. (A) Both statements are true, and Statement II explains Statement I.
Agricultural productivity in India remains low when compared to international standards, posing a challenge for the sector. This is the result of several interrelated factors that have traditionally hindered development. The heavy dependence on the unpredictable monsoon and the presence of small, fragmented landholdings limit the ability of farmers to adopt modern and efficient techniques. Furthermore, low levels of mechanization and inadequate access to modern inputs in many regions prevent the realization of full potential. Addressing these issues through technological and institutional reforms is essential for boosting overall productivity and farmer incomes.

168. (A) The National Food Security Act, 2013.
The 'Right to Food' campaign was a major social movement in India that advocated for food security as a fundamental right of every citizen. This long-standing campaign and subsequent judicial interventions ultimately led the government to enact the National Food Security Act in 2013. This legislation transformed the nature of food security from a welfare-based program into a legal entitlement. It ensures that a large portion of the population has access to subsidized food grains through the public distribution system, thereby providing a stronger legal framework for combating hunger and malnutrition in the country.

169. (B) (c) and (d) only
The industrial region centered around Bengaluru, Tamil Nadu, and Hyderabad has emerged as a major hub for modern and high-tech industries. Unlike older regions that focus

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objective of these policies. Instead, they aim to address the social and economic challenges associated with a rapidly growing population through education and empowerment.

195. (C) Exclusive focus on organic farming methods
The Green Revolution in India involved a specific package of technological and scientific inputs designed to boost agricultural productivity. This package included the use of high-yielding variety seeds, an assured supply of water through modern irrigation systems, and the intensive application of chemical fertilizers and pesticides. These modern inputs were essential for achieving the dramatic increase in food grain production during that period. However, the promotion of organic farming methods was not a part of this initial strategy. In fact, the Green Revolution focused on chemical-intensive farming, which is the opposite of organic agricultural practices.

196. (D) Historical advantages of port proximity and transport networks.
The development of major industrial regions in India, such as the Mumbai-Pune belt or the Hooghly belt, is not accidental but is driven by several favorable factors. A key reason for their growth is the historical advantage of proximity to major ports, which facilitates international trade. These regions also benefited from early development during the colonial period and the creation of extensive transport networks, including railways and roads. These infrastructures allowed for the efficient movement of raw materials, labor, and finished goods, making them attractive locations for various industries to cluster and grow over time.

197. (C) Higher concentration of roads in plains versus hilly regions.
The development of the roadway network in India has been significantly influenced by the country's varied topography and economic needs. Road density is much higher in the flat and fertile plains, where construction is easier and the population is concentrated. In contrast, hilly, mountainous, and desert regions have a much sparser and less developed road network due to the high cost and technical difficulty of construction. While recent projects have aimed to improve connectivity across all terrains, the overall pattern remains one where physical geography plays a major role in determining the accessibility and quality of the road system.

198. (B) A diversification of partners, with an increasing share of trade with Asian and developing countries.
India's external trade has undergone a significant shift in its direction over the recent decades. While the country historically relied heavily on trade with developed regions like Europe and North America, there is now a clear trend toward diversification. India has expanded its trade relations with other developing nations and has seen an increasing share of trade with various Asian countries. This diversification helps in reducing dependence on any single market and allows India to tap into new and growing economies. This shift reflects India's growing importance and integration within the wider global and regional trade networks.

NODIA

199. (D) Imbalanced development and regional disparities.
Regional development planning is a critical component of India's overall development strategy. Its primary goal is to address the persistent problem of imbalanced growth and significant disparities between different states and regions. By implementing targeted programs for infrastructure, healthcare, and education in backward or remote areas, the government seeks to ensure that every part of the country can progress. This approach is essential for achieving a more equitable distribution of national wealth and resources. Ultimately, regional planning aims to provide equal opportunities for all citizens, regardless of their location, and to foster more balanced socio-economic development across the entire country.

200. (A) Both statements are true, and Statement II explains Statement I.
The Himalayan glaciers, which form a crucial part of the Indian cryosphere, are currently experiencing an alarming rate of recession. This phenomenon is a direct consequence of global warming, which is causing temperatures in the high-altitude regions to rise faster than the global average. Additionally, increased air pollution, particularly the deposition of black carbon on ice surfaces, accelerates the melting process. This recession has significant long-term implications

global atmospheric circulation system, affecting long-distance air travel and regional weather conditions.

176. (B) Tundra Soil
India possesses a wide variety of soil types that reflect its diverse geological structure and climatic conditions. Major soil groups include alluvial soil, which is found in the fertile plains; black soil, prevalent in the volcanic Deccan region; and laterite soil, formed in tropical areas with heavy rainfall. However, tundra soil is not a major soil type in India. This soil is characteristic of the cold, treeless regions found in very high latitudes or extreme high-altitude areas above the tree line, which are very limited in the Indian subcontinent.

177. (B) Railways
The development and distribution of the railway network in India have been profoundly shaped by the country's physical landscape and its economic requirements. Railways are easiest to construct in flat, low-lying regions like the Northern Plains, where they form a dense and extensive network. In contrast, the rugged terrain of the Himalayan mountains and the uneven landscape of the Peninsular Plateau have made rail development more challenging and expensive. Despite these hurdles, railways have been prioritized to connect resource-rich areas with industrial hubs and ports, playing a crucial role in national economic integration and development.

178. (A) The types of goods and services being exported and imported.
The term 'composition' in the context of external trade refers to the specific nature and types of goods and services that a country exports and imports. It describes the breakdown of trade items, such as raw materials, manufactured goods, capital equipment, and services like IT and tourism. Analyzing the composition of trade provides valuable insights into the economic structure of a nation and its level of development. Over the decades, India's trade composition has shifted from a reliance on agricultural products to a more diverse mix of industrial goods, high-tech services, and petroleum products.

179. (A) Both A and R are true and R is the correct explanation of A.
For a geographically large and socially diverse country like India, regional planning is an essential strategy for achieving balanced national growth. The primary goal is to address and reduce the significant developmental imbalances that exist between different states and regions. By focusing on the specific needs and potential of backward or remote areas, the government aims to ensure that the benefits of economic progress reach all parts of the country. This approach fosters national unity, promotes equitable socio-economic development, and helps to manage the pressures of urbanization by creating opportunities across a wider geographical area.

180. (D) Constructing embankments, dams, and warning systems.
Floods are a recurrent and destructive hazard in many parts of India, necessitating effective mitigation strategies. The most appropriate and effective measures involve a combination of structural and non-structural approaches. These include the construction of embankments and dams to regulate river flow and the creation of early warning systems to alert communities of rising water levels. Furthermore, improving drainage in urban areas and implementing watershed management in catchment areas can help reduce the impact. These measures aim to control water movement and minimize the loss of life and property during extreme weather events.

181. (C) Himalayan rivers are perennial, while Peninsular rivers are largely rain-fed and seasonal.
The major difference between the Himalayan and Peninsular river systems lies in their source of water and their seasonal behavior. Himalayan rivers originate in the high-altitude mountains and are fed by both melting glaciers and monsoon rainfall. This ensures that they remain perennial, with water flowing throughout the year. In contrast, Peninsular rivers are primarily rain-fed and depend almost entirely on seasonal monsoon rains. As a result, they are mostly seasonal and often experience a significant reduction in water volume or even dry up completely during the long dry summer months.

182. (B) The type of vegetation changes with altitude in the Himalayan region.

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Analyzing this ratio provides essential insights into the socio-economic structure of a country. A high dependency ratio suggests that a large portion of the population relies on the productive efforts of a smaller working group, which can impact savings, investment, and the overall burden on social services. Monitoring changes in this ratio is crucial for formulating policies related to education, healthcare, and social security.

219. (D) Characteristics of rainfall, temperature, soil, and water resources.
The classification of India into fifteen agro-climatic zones for regional planning was based on a comprehensive set of environmental and physical parameters. The primary criteria used for this demarcation include the characteristics of rainfall, temperature variations, and the nature of the soil. Additionally, the availability and quality of water resources, both surface and groundwater, were considered. By grouping regions with similar ecological and climatic features together, the planning framework aims to promote more scientific and sustainable agricultural practices. This approach allows for the development of strategies that are specifically tailored to the unique potential and constraints of each zone, thereby enhancing productivity and resource management.

220. (B) Yellow Revolution - Jute Production
In the context of Indian agricultural history, different 'revolutions' refer to specific programs aimed at boosting the production of various commodities. The Green Revolution was focused on increasing the output of food grains like wheat and rice. The White Revolution aimed to transform the dairy sector and increase milk production. The Blue Revolution was targeted at the development and expansion of the fisheries sector. However, the Yellow Revolution was specifically launched to increase the production of oilseeds to achieve self-sufficiency in edible oils. It was not related to jute production, which is instead associated with the Golden Fiber Revolution.

221. (A) Both Statement I and Statement II are true.
The Industrial Policy Resolution of 1956 was a foundational document that shaped India's industrial development for several decades. It is often referred to as the 'Economic Constitution' of that era because it laid down the basic framework for a socialistic pattern of society. The resolution clearly defined the dominant role of the public sector in heavy and strategic industries while also outlining the space for private enterprise. By providing a clear vision for state-led industrialization and national self-reliance, the policy guided the allocation of resources and the growth of various industrial sectors, making it a central pillar of India's early economic planning and developmental strategy.

222. (D) Delhi, Mumbai, Chennai, Kolkata
The Golden Quadrilateral is a massive highway network that forms a critical part of India's transport infrastructure. This project was designed to connect the four major metropolitan cities that serve as the main economic and administrative hubs of the country. These cities are Delhi in the north, Mumbai in the west, Chennai in the south, and Kolkata in the east. By linking these four points with a network of high-quality, multi-lane highways, the project has significantly improved national connectivity. It facilitates faster movement of goods and people between these major centers, thereby boosting trade, supporting industrial growth, and fostering greater economic integration across the entire nation.

NODIA

223. (A) Policies of liberalisation and globalisation.
The dramatic increase in the volume and value of India's external trade since 1991 is a direct consequence of the policy shifts toward liberalization and globalization. Prior to this period, India followed a more protectionist and state-controlled economic model with significant barriers to international trade. The reforms dismantled many of these restrictions, reduced tariffs, and simplified procedures for exports and imports. This integration with the global economy has allowed India to expand its markets, attract foreign investment, and access advanced technologies. The resulting growth in trade has become a major driver of the country's overall economic development and its increasing importance on the world stage.

224. (B) Focusing all national resources on a single metropolitan city.
Regional development planning in India is focused on achieving balanced growth and

mountains that are still in the process of formation due to active tectonic movements. The ongoing collision between the Indian and Eurasian plates makes the region highly susceptible to frequent and powerful earthquakes. The steep slopes and fragile geological structure also lead to other hazards like landslides. In contrast, the Peninsular Plateau is one of the oldest and most stable geological blocks on Earth.

189. (C) The system of land tenure and size of landholdings.
Agricultural productivity in India is influenced by several institutional factors that govern how land is owned and used. One of the most significant factors is the system of land tenure and the size of individual landholdings. Issues such as the lack of clear land titles and the presence of small, fragmented plots can discourage farmers from investing in long-term land improvements or modern machinery. These institutional barriers prevent the efficient use of resources and can limit the benefits of technological advancements. Therefore, land reforms and improved credit facilities are essential for boosting the overall productivity of the sector.

190. (D) The eastern coast (Odisha, Andhra Pradesh, and West Bengal).
India's long coastline makes it vulnerable to tropical cyclones, but the impact is most severe on the eastern coast. States like Odisha, Andhra Pradesh, and West Bengal are particularly susceptible to these storms, which originate in the Bay of Bengal. The high sea surface temperatures and atmospheric conditions in this region favor the formation and intensification of cyclonic systems. These storms bring devastating winds, heavy rains, and storm surges that can cause immense destruction to coastal communities and agriculture. In contrast, the western coast generally experiences fewer and less intense cyclonic activities.

191. (A) The distribution of people based on their shared ancestry, culture, and language.
Ethnic composition is a demographic term used to describe the distribution of a population based on shared characteristics like ancestry, culture, and language. It reflects the diverse origins and historical background of the people living in a region. In India, ethnic composition is incredibly complex due to thousands of years of migration and social interaction between various human streams. Analyzing this composition helps in understanding the cultural fabric of the nation and the social dynamics of different groups. It is distinct from religious or linguistic composition, although these factors often overlap with an individual's overall ethnic identity.

192. (B) The formation of the Himalayan mountains.
The formation of the Himalayan mountains is a direct and spectacular consequence of plate tectonics. Millions of years ago, the northward-drifting Indian Plate began to collide with the massive Eurasian Plate. The intense pressure and compression caused by this ongoing collision forced the layers of the Earth's crust to buckle and rise, creating the world's highest mountain range. This process is still active today, meaning the Himalayas are young fold mountains that continue to grow in elevation. This collision has also shaped the broader geological and climatic features of the entire Indian subcontinent.

193. (B) P-3, Q-4, R-1, S-2
India is subject to various natural hazards that are linked to its specific geological and meteorological conditions. Himalayan highland hazards, such as landslides, are primarily caused by the region's tectonic instability and steep slopes. Tsunamis are a marine hazard triggered by undersea earthquakes or crustal displacement. Drought is a meteorological phenomenon resulting from a significant and prolonged deficiency in rainfall. Floods are often caused by heavy rainfall in river catchment areas or the sudden failure of dams. Understanding these primary causes and prone regions is essential for effective disaster management and risk reduction strategies.

NODIA

194. (A) To encourage a high population growth rate for a larger workforce.
India's population policies are designed with the goal of improving the quality of life and ensuring that population growth is sustainable. They focus on providing better healthcare, reducing infant and maternal mortality, and encouraging family planning through voluntary measures. The long-term objective is to achieve a stable population that is consistent with the country's resources and development goals. Promoting a high population growth rate to increase the workforce is not an

The natural vegetation of India is incredibly diverse, with the types of forests varying based on regional climate and topography. While tropical deciduous forests are the most widespread throughout the country, the Himalayan region exhibits a unique pattern. In these mountains, the vegetation changes significantly with increasing altitude, reflecting the corresponding decrease in temperature. This creates a vertical succession of vegetation zones, ranging from tropical forests at the foothills to temperate forests, and finally to alpine and tundra-like vegetation at the highest elevations. This altitude-based change is a defining characteristic of mountain ecosystems.

183. (D) 15
To facilitate more effective and scientific regional planning in the agricultural sector, the Planning Commission of India divided the country into fifteen distinct agro-climatic zones. This classification was based on several critical parameters, including rainfall patterns, temperature variations, and the availability of soil and water resources. By identifying these zones, the government aimed to develop region-specific agricultural strategies and cropping patterns that are better suited to the local environment. This approach is essential for increasing productivity, promoting diversification, and ensuring the sustainable use of natural resources across the diverse geographical regions of India.

184. (A) Potential demographic dividends and employment challenges.
The presence of a youth bulge in India's demographic profile presents a unique combination of opportunities and challenges. On one hand, it offers a massive potential demographic dividend, where a large working-age population can drive economic growth, innovation, and savings. On the other hand, this youthful population requires significant investments in education, healthcare, and skill development to be productive. Furthermore, the economy must generate millions of new jobs every year to absorb this growing workforce. Successfully managing this youth bulge is critical for ensuring long-term national prosperity and social stability in the coming decades.

185. (B) (a), (c), and (d)
India is a mineral-rich country with substantial reserves of various resources. It is a major global producer of both coal and iron ore, which are foundational to its energy and steel sectors. Bauxite is the essential ore used for extracting aluminum and is found in several plateau regions. The Kolar Gold Fields, although now largely exhausted, are a historically significant site located in the state of Karnataka. However, the claim that most of India's petroleum reserves are in the Himalayas is incorrect; instead, major reserves are found in offshore fields and specific regions like Assam and Gujarat.

186. (A) The Arabian Sea branch of the Southwest Monsoon striking the Western Ghats.
The heavy rainfall experienced along the Malabar Coast of South India is a direct result of the southwest monsoon. During this season, moisture-laden winds blow from the Arabian Sea toward the land. As these winds strike the Western Ghats, the air is forced to rise, leading to intense orographic precipitation. The Malabar Coast, being on the windward side of these mountains, receives some of the highest rainfall in the country. This moisture is crucial for the region's lush natural vegetation and its successful cultivation of various tropical and plantation crops.

187. (A) Both Statement I and Statement II are true, and Statement II is the correct explanation of Statement I.
Internal trade in India involves the exchange of goods and services within the national boundaries and is much larger in volume and value than the country's external trade. This is primarily due to the vast size of the domestic market and the immense diversity of natural resources and production capabilities across different states. The complex web of regional specialization means that different parts of the country rely on each other for various essentials, from food grains to minerals. This extensive internal trade is facilitated by the growing national transport network and a unified economic market.

188. (B) The Northern Mountains (Himalayas)
Among the major physiographic divisions of India, the Northern Mountains, or the Himalayas, are considered the most unstable landmass. This is because they are geologically young fold

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for the water security of millions of people who depend on the perennial rivers fed by these glaciers. Protecting these vital reservoirs requires urgent global and national action to mitigate climate change and reduce pollution.

201. (C) Mostly dendritic and radial patterns.
The Peninsular Plateau of India features a well-established and geologically ancient drainage system. The rivers in this region generally exhibit a stable and predictable flow pattern. One of the most characteristic features of this system is the prevalence of dendritic and radial drainage patterns. A dendritic pattern, which resembles the branches of a tree, develops on rocks with a uniform structure. A radial pattern occurs when rivers flow in different directions from a central high point. These patterns reflect the mature stage of the drainage system and the underlying geological structure of the ancient peninsular landmass.

202. (A) The Peninsular region, especially near the coast
The degree of seasonal contrast in weather varies across the different regions of India due to its vast size and varied geography. While the northern plains and the Himalayan region experience extreme variations in temperature between summer and winter, the coastal areas of the peninsula see much more moderate changes. This minimal seasonal contrast is due to the moderating influence of the surrounding oceans, namely the Arabian Sea and the Bay of Bengal. In these coastal regions, the maritime effect keeps temperatures relatively stable and pleasant throughout the year, preventing the extreme heat or cold found in the continental interior.

203. (D) The availability of water and the quality of land.
In a country where a large majority of the people depend on the land for their livelihood, the spatial distribution of the population is profoundly influenced by environmental factors. The primary determinants of where people live are the availability of clean water and the presence of fertile soil. Areas with abundant water from perennial rivers and rich alluvial deposits, such as the Northern Plains and river deltas, have historically supported high population densities. These natural resources are fundamental for agriculture and human settlement, and they continue to play a more significant role in population distribution than political boundaries or historical monuments.

204. (B) (a), (b), (c), and (d) only
Marine resources encompass a wide variety of biological, mineral, and energy assets found in the oceans and coastal waters. These include biological resources like fish and aquatic organisms that are vital for food and livelihood. They also include valuable minerals like polymetallic nodules on the sea-bed and mineral oil and gas extracted from offshore fields. Furthermore, the oceans offer immense potential for renewable energy from tides and waves. However, terrestrial minerals like coal, which are mined from land-based deposits, are not considered marine resources. Together, these oceanic assets represent a significant potential for supporting the future economic and resource needs of the nation.

NODIA

205. (C) To create a framework for scientifically diversifying cropping patterns.
The primary motivation for dividing India into fifteen agro-climatic zones was to create a more scientific and regionalized framework for agricultural planning. Each zone is defined by a unique combination of factors such as rainfall, temperature, soil types, and water availability. This classification allows the government to develop strategies that are specifically tailored to the local environment. By identifying the specific agricultural potential and constraints of each zone, policymakers can promote crop diversification, improve irrigation management, and enhance overall productivity. This approach ensures that agricultural development is sustainable and more closely aligned with the natural resources available in different parts of the country.

206. (D) Increased income inequality between large and small farmers.
While the Green Revolution brought about a major increase in national food production, it also had significant and often negative social consequences. One of the most prominent issues was the increase in income inequality within the rural community. The high cost of modern inputs like high-yielding variety seeds and irrigation

meant that only large and resourceful farmers could fully benefit from the new technology. In contrast, small and marginal farmers often lacked the capital to invest, causing them to fall behind. This led to a widening gap between different groups of farmers, creating social tensions and affecting the traditional socio-economic structure of rural areas.

207. (A) Liberalization, privatization, and globalization.
The year 1991 marked a watershed moment in India's industrial and economic policy. Following a severe economic crisis, the government introduced a series of radical reforms that moved the country toward a more market-oriented system. These changes are famously summarized as liberalization, privatization, and globalization. The new strategy focused on reducing state intervention, dismantling the restrictive licensing regime, and opening up the economy to international trade and investment. By encouraging private enterprise and integrating with the global market, the policy aimed to modernize the industrial sector, boost productivity, and accelerate economic growth through competition and technological advancement.

208. (B) Roadways
Roadways are a vital component of India's transport infrastructure, especially for ensuring connectivity to the country's vast and diverse interior regions. Unlike railways or waterways, which are limited by terrain or the presence of water bodies, roads can be built across almost any landscape, including mountains and remote rural areas. This makes them the most flexible and essential mode of transport for providing last-mile connectivity and for the movement of people and goods in areas that lack other transport options. Developing a robust road network is therefore crucial for promoting socio-economic development and integrating remote communities into the national mainstream.

209. (B) The value of imports is greater than the value of exports.
The balance of trade is a measure of the difference between the value of a country's exports and its imports over a specific period. India has persistently experienced a negative balance of trade, also known as a trade deficit. This means that the total value of the goods and services that the country imports from abroad is consistently higher than the value of the goods and services it exports. This deficit is primarily driven by the large and growing national demand for essential items like crude oil, gold, and capital goods, which outweighs the revenue generated from exports, despite their significant growth.

210. (A) Farmers must compete with subsidised agriculture from abroad.
The integration of the Indian economy with global markets under the process of globalisation has brought new challenges to the agricultural sector. One of the most significant impacts is that Indian farmers must now compete with highly subsidized agricultural products from developed nations. As trade barriers are lowered, global price fluctuations directly affect local farmers, who often lack the resources to cope with such volatility. While globalisation has opened some new export opportunities, it has also put pressure on traditional farming systems and raised concerns about the long-term livelihood security and competitiveness of small and marginal farmers in the face of international competition.

211. (A) Both A and R are true and R is the correct explanation of A.
The Northern Plains of India are renowned for being one of the most densely populated regions on the planet. This high concentration of people is a direct result of several favorable environmental factors. The plains possess extremely fertile alluvial soil deposited by the Ganga and Brahmaputra river systems, which is ideal for intensive agriculture. Furthermore, the region enjoys a favorable climate and an abundant supply of water from perennial rivers and groundwater. These resources have historically supported high agricultural productivity and provided a stable foundation for human settlements and urban growth over thousands of years, leading to the exceptionally high population density observed today.

212. (D) Glacial Lake Outburst Flood (GLOF)
The Himalayan cryosphere is a highly dynamic environment that is prone to several specialized natural hazards. Among these, the Glacial Lake Outburst Flood (GLOF) is a major threat directly

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linked to the melting of glaciers. This occurs when the natural dam holding a glacial lake, which is often composed of loose rock and ice, suddenly fails. This results in the rapid discharge of a massive volume of water downstream, causing devastating floods that can destroy life, property, and infrastructure. These events are becoming more frequent as global warming causes glaciers to recede and glacial lakes to grow, making GLOF management a critical part of disaster risk reduction.

213. (C) The Peninsular Plateau
The Western Ghats and the Eastern Ghats are two prominent mountain ranges that form the coastal boundaries of the Peninsular Plateau of India. The Western Ghats run parallel to the western coast and are characterized by a continuous, high, and rugged mountain wall. In contrast, the Eastern Ghats are discontinuous and lower in elevation, having been eroded by major east-flowing rivers. These two ranges meet at the Nilgiri Hills in the south. They play a vital role in determining the regional climate, supporting diverse ecosystems, and influencing the drainage patterns of the peninsula. They are integral features of the ancient and geologically stable peninsular landmass.

214. (B) Jamuna
The Brahmaputra is a major transboundary river that flows through China, India, and Bangladesh. It has different names along its long and complex course. Upon entering Bangladesh from India, the main channel of the river is known as the Jamuna. It flows southward and eventually joins the Padma, which is the main distributary of the Ganga. Together, these rivers form a massive and fertile delta before draining into the Bay of Bengal. The Jamuna is a vital waterway for Bangladesh, although its unpredictable behavior and frequent shifting of channels pose significant challenges for the people living along its banks and for regional transport.

215. (D) The onset of the Southwest Monsoon.
The tropical easterly jet stream is a high-altitude wind current that develops over the Indian subcontinent during the summer season. Its formation is closely linked to the intense heating of the Tibetan plateau. This jet stream plays a crucial role in the mechanism of the Indian climate as it is associated with the onset of the southwest monsoon. By influencing the atmospheric pressure patterns, it helps in drawing moisture-laden winds toward the Indian landmass. The presence and position of this jet stream are key indicators for meteorologists in predicting the timing and strength of the monsoon, which is the primary source of rainfall for the country.

NODIA

216. (A) Mangrove Forests
The deltaic regions of the Ganga and Brahmaputra, particularly in West Bengal, are home to a unique type of natural vegetation known as mangrove forests. These forests are specially adapted to survive in the brackish water and muddy soil of the tidal areas. The trees have specialized roots that allow them to breathe in the waterlogged environment. The most famous species found in this region is the Sundari tree, after which the Sundarbans forest is named. These mangrove ecosystems are vital for protecting coastal areas from erosion and storm surges and provide a rich habitat for a wide variety of flora and fauna, including the Royal Bengal Tiger.

217. (C) Highly uneven, with a major concentration in the Peninsular Plateau.
The distribution of mineral resources in India is highly uneven and is primarily determined by the country's complex geological history. A major concentration of valuable metallic and non-metallic minerals is found in the ancient crystalline rocks of the Peninsular Plateau. This region, particularly the Chota Nagpur plateau and the surrounding areas, is a powerhouse for minerals like iron ore, coal, and mica. In contrast, the Northern Plains are largely composed of alluvial deposits and are poor in mineral resources. Similarly, the Himalayan region has diverse but often inaccessible mineral deposits. This uneven pattern has dictated the location of major industries and has significant implications for regional economic development.

218. (A) Age composition
The dependency ratio is a key indicator used in the study of a population's age composition. It measures the relationship between those who are in the productive, working-age group and those who are in the non-working or dependent age groups, namely children and the elderly.

on heavy metallurgy or textiles, this area is characterized by its leadership in the information technology, electronics, and aerospace sectors. It is also a significant center for machine tools and pharmaceuticals. The growth of this region has been driven by the availability of a highly skilled workforce, numerous research and development institutions, and favorable policies that promote innovation and global competitiveness in these modern sectors.

170. (A) The monsoon winds.
While several geographical factors influence the Indian climate, the monsoon system stands out as the most significant determinant. The seasonal reversal of wind direction and the resulting patterns of rainfall and temperature affect almost every part of the country. The monsoon dictates the agricultural cycle, which is the backbone of the Indian economy, and replenishes the water resources necessary for life and industry. Its arrival and withdrawal are the most anticipated weather events, and its variability directly impacts the socio-economic well-being of millions, making it the central feature of India's climate.

171. (D) Rich deposits of minerals
The Chota Nagpur Plateau is a geologically ancient region that is exceptionally rich in mineral wealth. It is often referred to as a mineral storehouse or the heartland of Indian minerals. The plateau contains vast and high-grade deposits of iron ore, coal, mica, and several other metallic and non-metallic minerals. These resources have been the foundation for the development of major industrial belts in eastern India, particularly in the iron, steel, and power sectors. The presence of these minerals has played a crucial role in the industrialization and economic development of the entire country.

172. (B) Greater integration with the world economy through trade and investment flows.
Globalisation has had a transformative impact on the Indian economy, characterized by its integration with the global economic system. This process has led to a significant increase in the flow of international trade and investment. Policies have moved toward greater openness, allowing for more competition and the entry of multinational corporations. This integration has facilitated the exchange of advanced technology and capital, leading to the rapid growth of several modern industries and the service sector. Overall, globalisation has made the Indian economy more outward-looking and more closely connected to global supply chains and economic trends.

173. (C) The collision of the Indian Plate with the Eurasian Plate.
The Himalayan region is one of the most seismically active zones in the world, experiencing frequent and often powerful earthquakes. The primary reason for this high level of activity is the ongoing collision between the Indian Plate and the Eurasian Plate. As the Indian plate moves northward and pushes against the Eurasian plate, immense pressure builds up in the Earth's crust. When this pressure is released, it results in earthquakes. This tectonic process is also responsible for the continuing rise of the Himalayan mountains, making the entire region geologically youthful and structurally unstable.

174. (D) The change in population from high birth and death rates to low birth and death rates.
The demographic transition theory is a fundamental concept used to explain the historical changes in a population's birth and death rates. In the context of India, this theory helps to describe the transition from a stage of high birth and death rates to a stage of declining rates. India has moved through various phases, including a period of high growth due to falling mortality and high fertility. The theory provides a framework for understanding how socio-economic development, improvements in healthcare, and changes in social attitudes lead to a more stable and balanced population structure over time.

175. (A) A narrow belt of high-altitude, fast-moving winds in the upper atmosphere.
A jet stream is a narrow and fast-moving belt of winds that circulates in the upper levels of the atmosphere, typically at high altitudes. These winds play a crucial role in the earth's weather patterns and climate. In the context of India, the sub-tropical westerly jet stream and the tropical easterly jet stream are particularly important. They influence the arrival of the monsoon and the movement of cyclonic disturbances. These high-speed currents are separate from surface winds and are a key component of the

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reducing disparities between different parts of the country. Its major objectives include the development of backward and remote regions, such as hill and tribal areas, through specialized programs. The goal is to ensure that all states can achieve a minimum level of socio-economic progress and to reduce inter-state economic imbalances. However, concentrating all national resources on a single metropolitan city is not a focus area. In fact, regional planning aims to prevent such over-concentration and instead promote more equitable and decentralized development, ensuring that the benefits of national progress are spread more widely across all regions.

225. (B) Significant highland hazards.
The Himalayas are characterized by high altitudes, steep slopes, and significant geological instability, making the region highly vulnerable to various natural disasters. Among these, landslides and avalanches are the most common and devastating highland hazards. These events are often triggered by heavy monsoon rains, rapid snowmelt, or seismic activity in this tectonically active zone. The susceptibility of the Himalayas to these hazards poses a constant threat to human settlements, transport infrastructure, and the overall socio-economic life of the region. Managing these risks through scientific monitoring and disaster preparedness is essential for the safety and sustainable development of communities living in these fragile high-mountain environments.

226. (A) Arunachal Pradesh
Population density is a measure that reflects the number of people living in a unit area of land. In India, this density varies tremendously across different states due to variations in climate, topography, and resource availability. According to the data from the 2011 Census, Arunachal Pradesh has the lowest population density in the entire country. This is primarily due to its rugged mountainous terrain, vast forest cover, and difficult climatic conditions, which have traditionally limited human settlement. These geographical challenges mean that a very large area of the state is inhabited by a relatively small number of people, resulting in a significantly lower density compared to the national average.

227. (C) Submergence of forests and displacement of communities.
Large river valley projects in India have been developed to manage water resources for irrigation and hydroelectric power. While they offer significant benefits, they have also faced major environmental and social criticisms. A key negative impact is the large-scale submergence of fertile agricultural lands and pristine forests when reservoirs are created. This leads to a loss of biodiversity and significant ecological disruption. Furthermore, these projects often result in the displacement of local communities, particularly tribal and marginalized groups, who lose their traditional livelihoods and homes. Addressing these environmental and social costs is a major challenge in the planning and implementation of large-scale water resource projects.

228. (D) An old, super-imposed system with broad, graded valleys.
The drainage system of Peninsular India is geologically very old and has reached a mature stage of evolution. Unlike the youthful Himalayan rivers, the peninsular rivers have had millions of years to erode their paths, resulting in broad and graded valleys. They flow over a stable, hard rock base and generally follow a well-defined and predictable course. Many of these rivers are super-imposed, meaning their courses were established before the current landforms were fully developed. Their characteristics reflect the stability and ancient nature of the peninsular landmass. Furthermore, because they are primarily rain-fed and lack major sediment loads, they are generally more stable and less prone to shifting their courses.

NODIA

229. (A) P-4, Q-1, R-2, S-3
Demographic analysis uses various indicators to measure different aspects of a population. Population growth is typically measured by the decadal growth rate, which shows the percentage change over ten years. Population distribution is reflected in the density of population, indicating the pressure of people on the land. Population composition includes several attributes, with the sex ratio being a key measure of the gender balance. Factors that influence the change in population are known as determinants, and the crude birth rate is a primary example of such a

state-owned enterprises in the public sector. This approach was intended to foster self-reliance and reduce dependence on foreign imports by building the necessary infrastructure for a modern industrial economy.

287. (C) rich deposits of minerals and coal.
The industrial concentration in the Chota Nagpur Plateau is driven by its unique geological resource endowment. This region contains the country's most significant deposits of essential minerals, including iron ore and coal. The easy availability of these raw materials has naturally fostered the growth of heavy metallurgical industries and engineering works, making it a vital hub for India's industrial sector.

288. (B) liberalization, privatization, and globalization.
The year 1991 marked a major turning point in India's economic history with the introduction of new policies. These reforms focused on opening up the economy by reducing government regulations, allowing for more private ownership, and integrating with the global market. This shift towards liberalization and privatization encouraged competition, attracted foreign investment, and changed the landscape of industrial growth.

289. (D) Uniform climatic conditions
Industrial regions develop based on several localized advantages. Factors such as being near raw material sources, having access to reliable power, and being close to large consumer markets or ports are essential. While the local climate may affect certain specific industries, having uniform climatic conditions across the entire country is not a requirement or factor in regional industrialization.

290. (A) a product of a mix of factors including location, resources, and policy.
The Mumbai-Pune industrial belt serves as an example of how multiple factors converge to create a successful economic zone. Its growth is not due to a single cause but results from its strategic coastal location, access to a large urban market, and supportive government policies. This combination has allowed it to develop a highly diversified industrial base including various modern sectors.

291. (C) Railways
Railways serve as the primary mode for transporting large volumes of goods and passengers over long distances across India. The network's layout is heavily influenced by the country's terrain. It is particularly extensive and dense in the flat northern plains, where construction is easier and population density is high, making it the central pillar of the nation's transport infrastructure.

292. (A) They offer door-to-door service and connectivity to remote areas.
Road transport offers a unique level of flexibility that other modes cannot provide. Its primary strength lies in its ability to reach the exact point of origin or destination, providing essential door-to-door service. This makes roadways indispensable for connecting remote villages and mountainous areas where building larger infrastructure like railways or airports is either impractical or too costly.

293. (D) moving crude oil, petroleum products, and gas.
Pipelines represent a highly specialized and efficient infrastructure designed for the continuous movement of specific commodities. They are primarily used to transport fluids and gases, such as crude oil from wells to refineries, and finished petroleum products or natural gas to markets. This mode reduces the congestion on roads and railways and provides a safe transport solution.

294. (B) A diversification from primary products to include manufactured goods and services.
India's trade relationship with the rest of the world has evolved significantly over the decades. In the past, exports were largely dominated by raw materials and primary agricultural products. However, there has been a major shift toward a more complex mix that includes manufactured items and a wide range of services, reflecting the modernization and diversification of the domestic economy.

295. (C) In the Himalayan region and the northeast.
The physical geography of certain regions poses significant challenges to the expansion of rail infrastructure. In the high-altitude Himalayan ranges and the rugged, forested terrain of the

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of fragmented landholdings. These reforms provide farmers with more incentives to invest in their land and adopt better farming practices. In contrast, factors like rainfall, soil type, and temperature are physical and environmental elements that influence agriculture but are not created by institutions.

236. (B) Dismantle regulations and integrate globally.
The primary aim of the Industrial Policy of 1991 was to fundamentally restructure the Indian economy to make it more efficient and globally competitive. It sought to dismantle the restrictive regulatory framework, popularly known as the 'License Raj', which had governed industrial development for decades. By abolishing licensing for most industries and reducing the number of sectors reserved for the public sector, the policy aimed to encourage private enterprise and entrepreneurship. Furthermore, it focused on integrating the Indian economy with global markets by liberalizing foreign investment and technology flows. These changes were intended to stimulate industrial growth through competition, modernization, and a greater reliance on market forces rather than state control.

237. (C) The countries with which India trades.
In the study of international economics, the 'direction' of a country's foreign trade refers to the geographical distribution of its exports and imports. It identifies the specific countries and regions with which a nation conducts its trade. Analyzing the direction of trade helps in understanding the shifting patterns of global economic relations and the changing importance of various trading partners over time. For India, the direction of trade has diversified significantly since 1991, with an increasing share of trade moving toward other developing nations and major economies in Asia, while traditional partners in Europe and North America remain important. This reflects India's evolving role in the global supply chain.

238. (D) To ensure balanced and equitable development across all regions of a country.
Regional development planning is a strategic approach designed to ensure that the benefits of economic progress are not concentrated in just a few pockets but are shared more widely. Its primary objective is to promote balanced and equitable development across all regions of a country. By focusing on the specific needs of backward, remote, or resource-poor areas, the planning framework aims to reduce socio-economic disparities and provide equal opportunities for all citizens, regardless of where they live. This approach is essential for achieving overall national prosperity, fostering social stability, and managing the pressures on infrastructure and resources that come with uneven development and rapid, unplanned urbanization in metropolitan centers.

239. (A) It occurred in the Deccan Plateau, a region previously considered seismically stable or of low risk.
The Latur earthquake that occurred in 1993 was a landmark event in the study of seismology in India. Its significance lies in its location within the Deccan Plateau of Maharashtra. Prior to this event, the peninsular region was generally considered to be a seismically stable or low-risk zone, as it is composed of ancient and hard rock. The devastating earthquake challenged this prevailing view and highlighted that even supposedly stable geological blocks can experience major seismic events. This led to a re-evaluation of seismic risk maps and influenced changes in building codes and disaster preparedness strategies across the country, showing that earthquake hazards are not limited to the active mountain belts of the north.

240. (B) Natural growth rate.
The natural growth rate of a population is a demographic measure that reflects the difference between the number of births and the number of deaths in a country over a specific period. It is usually expressed as a rate per thousand of the population. This rate shows how much a population would grow or decline due to biological factors alone, without considering the impact of migration into or out of the territory. Understanding the natural growth rate is essential for analyzing population trends and for planning healthcare, education, and other essential services. A high natural growth rate indicates a rapidly expanding population, while a low or negative rate suggests a stable or declining one.

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factor. Each of these measures provides a different perspective for understanding and planning for a nation's human resources and socio-economic needs.

230. (B) Buffer stock and Public Distribution System.
The food security system in India is a comprehensive framework designed to ensure that everyone has access to adequate food at all times. It is composed of two main and interconnected components. First, the government maintains a buffer stock of essential food grains like rice and wheat, which is managed by the Food Corporation of India to ensure availability during shortages. Second, these grains are distributed to vulnerable sections of the population at subsidized prices through the Public Distribution System (PDS). Together, these two mechanisms form the backbone of the national strategy to prevent hunger, ensure nutritional security, and protect the people from fluctuations in food production and market prices.

231. (D) Jhansi
The National Highways Development Project includes two major corridors that aim to link the four corners of India. The North-South corridor connects Srinagar in the north with Kanyakumari in the south. The East-West corridor links Silchar in the east with Porbandar in the west. These two massive highway arteries are designed to facilitate efficient long-distance travel and trade across the entire country. A significant geographical feature of these corridors is that they intersect at the city of Jhansi in Uttar Pradesh. This intersection point is strategically important for national logistics and highlights the central role of this region in the overall connectivity and transport network of India.

232. (B) (b), (c), and (d) only
India's diverse physical features lead to different regional vulnerabilities to natural disasters. Floods are indeed a recurrent and devastating phenomenon in the vast Ganga and Brahmaputra basins due to heavy monsoon rains. The eastern coast is historically more prone to tropical cyclones originating in the Bay of Bengal than the western coast. Drought is a unique hazard that develops slowly and affects large parts of the arid and semi-arid regions of western and central India. However, the claim that earthquakes are most common in the peninsular shield is incorrect; they are most frequent in the highly seismic Himalayan region. These patterns reflect the complex interaction between geology and climate.

233. (C) A swampy and marshy region with re-emerged streams and thick vegetation.
The Terai is a distinct physiographic region located immediately to the south of the Bhabar belt in the Northern Plains. While the Bhabar is a porous zone where streams disappear, the Terai is where these underground waters re-emerge on the surface. This creates a swampy and marshy region characterized by thick natural vegetation and a high level of biodiversity. Historically, this area was known for its dense forests and abundant wildlife. Over time, much of the Terai has been cleared for agriculture, but its original characteristics as a re-emerged, moisture-rich zone remain its defining trait within the overall landscape of the plains.

234. (A) Regulating the water flow of North Indian rivers.
The Himalayan cryosphere, which includes vast glaciers and permanent snow cover, plays a critical and life-sustaining role in the geography of North India. It acts as a massive natural water tower that provides a continuous supply of water to major perennial river systems like the Indus, Ganga, and Brahmaputra. These rivers are fed by the gradual melting of ice and snow, ensuring that they flow even during the dry summer months. Consequently, the cryosphere is fundamental for the water security, agriculture, and hydroelectric power generation of a region inhabited by hundreds of millions of people. Any changes in this frozen reservoir have profound implications for the entire subcontinent.

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235. (D) Land reforms
Agricultural productivity is shaped by various factors, including the environmental conditions and the human-made structures that govern land use. Institutional factors refer to these human-made frameworks, which include laws, policies, and social organizations. Land reforms are a key example of an institutional factor in Indian agriculture. They aim to improve productivity and social justice by addressing issues like land ownership, tenure security, and the consolidation

impact of globalisation is that it does not insulate a nation from global economic shocks. Instead, fluctuations in the world economy, such as financial crises or changes in global commodity prices, can have a direct and significant impact on India's growth and stability. Navigating these external challenges while taking advantage of the opportunities offered by a more connected world is a key task for national economic management in the modern era.

247. (D) National level
Disaster management in India is organized through a multi-layered institutional framework to ensure effective preparedness and response. At the top of this hierarchy is the National Disaster Management Authority (NDMA), which is the apex body responsible for policy formulation and coordination at the national level. It is headed by the Prime Minister and provides guidelines for disaster management across the country. Parallel authorities also exist at the state and district levels to ensure that policies are implemented and responses are coordinated on the ground. This decentralized but hierarchically structured system aims to improve the nation's ability to cope with various natural and human-made disasters by involving all levels of government in the planning and mitigation process.

248. (A) Meghna
The Ganga and the Brahmaputra are two of the largest river systems in the world, and they follow a complex path toward the sea. After flowing through India, both rivers enter Bangladesh, where they eventually join each other. The combined stream of these two massive rivers is known as the Meghna before it finally discharges its water into the Bay of Bengal. This unified river carries a huge volume of water and sediment, which has historically helped in the formation of the world's largest and most fertile delta. The Meghna is a vital waterway for the region, and its expansive mouth is a prominent feature of the geography of the Bengal basin and the coastal area.

249. (D) The sex ratio has been consistently above 1000 since 1951.
The demographic profile of India has undergone several changes, but some trends remain concerning. Literacy rates have improved significantly over the decades, although disparities between genders and between rural and urban areas persist. The country also features a prominent 'youth bulge'. However, the claim that the sex ratio has been consistently above one thousand since 1951 is factually incorrect. In reality, the overall sex ratio in India has historically been unfavorable to females, consistently remaining below the one thousand mark in every census since independence. This persistent gender imbalance reflects deep-seated socio-economic issues and highlights the ongoing need for targeted policies aimed at improving the status and welfare of the female population in the country.

250. (A) Pipelines
Transport networks in India are specialized based on the nature of the goods being moved. For the transportation of liquids and gases over long distances, pipeline networks are considered the most efficient and cost-effective mode. Pipelines are extensively used for moving crude oil, petroleum products, and natural gas from production sites and ports to refineries and industrial centers. They offer several advantages, including a continuous supply, minimal maintenance costs, and reduced risk of transport-related accidents and environmental pollution. While railways and roadways are essential for passengers and solid freight, pipelines have become the backbone of the energy infrastructure, ensuring that vital resources are delivered reliably across the vast longitudinal and latitudinal extent of the country.

251. (B) The physiographic regions are interconnected, with features of one region significantly impacting others.
India's physiographic regions are intrinsically linked, forming a unified geographical system. The Himalayas provide perennial water sources and act as a climatic barrier, while the Indo-Gangetic Plain is formed by sediments from these mountains. This interdependence ensures that geological and geomorphological changes in one area profoundly influence the drainage, climate, and resource patterns of others throughout the country.

252. (A) extensive alluvial deposits and low relief.

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The immense agricultural success of the Indo-Gangetic Plain stems from its unique physical geography. As an aggradational surface, it has been built over millennia by the continuous deposition of silt from the Indus, Ganga, and Brahmaputra river systems. This process creates exceptionally fertile soil and a level terrain that facilitates irrigation and large-scale farming activities in the region.

253. (C) The Plateau is an ancient, stable landmass while the Himalayas are a young, tectonically active range.
Geological maturity and tectonic activity distinguish the two major landforms. The Peninsular Plateau is characterized as an ancient, stable structure composed of crystalline rocks, representing one of the earth's oldest crustal blocks. In sharp contrast, the Himalayas are young, tectonically active fold mountains formed by recent plate collisions, featuring complex structures, deep valleys, and towering peaks across the north.

254. (D) perennial, fed by sources within the Himalayan region.
Rivers flowing through the northern plains are characterized by their continuous, year-round water supply. This perennial nature is primarily due to their origins in the high-altitude glaciers of the Himalayan mountain range. Unlike purely rain-fed systems, these rivers receive water from both seasonal monsoon precipitation and the melting of snow and ice during the warmer summer months of the year.

255. (C) an ancient and stable horst-like landmass.
The structural framework of the Peninsular Plateau is defined by its stability and ancient origins. It exists as a massive, elevated block or horst-like feature that has remained tectonically firm over geological eras. Unlike the folded mountain chains, this region is composed of solid igneous and metamorphic rocks, featuring rolling hills and broad valleys that slope gently toward the east.

256. (B) Himalayan rivers are perennial due to dual sources, while Peninsular rivers are largely seasonal and rain-fed.
The fundamental difference between the two drainage systems lies in their water sources and flow consistency. Himalayan rivers are perennial, receiving water from both glacial melt and monsoon rains, ensuring flow throughout the year. Conversely, Peninsular rivers are predominantly rain-fed, leading to significant seasonal fluctuations where their volume decreases drastically or dries up during the non-monsoon periods of the year.

257. (D) They are fed by both glacial meltwater and monsoon rainfall.
The continuous flow of water in Himalayan rivers is maintained by a dual-source mechanism. During the monsoon season, heavy rainfall provides substantial volume. In the drier pre-monsoon and summer months, the melting of snow and glaciers from the high mountain peaks ensures a steady supply. This combination prevents these rivers from drying up, unlike purely rain-fed systems in the south.

258. (A) east-flowing rivers typically form deltas, while west-flowing ones often form estuaries.
Topographical differences and the nature of the coastline influence the terminal features of Peninsular rivers. East-flowing rivers traverse gentler gradients across the plateau and deposit vast amounts of sediment as they enter the shallow Bay of Bengal, forming deltas. West-flowing rivers, however, move through steep rift valleys and enter the Arabian Sea directly, creating estuaries instead of extensive river deltas.

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259. (C) existing topography of the ancient plateau landmass.
The direction and behavior of Peninsular rivers are dictated by the ancient geological structure of the region. The plateau's general eastward tilt and established landforms guide these rivers along specific paths. Because the landmass is ancient and stable, the drainage lines have become well-adjusted to the existing topography, exhibiting graded profiles and shallower valleys compared to much younger river systems.

260. (A) origin in high mountains leading to steep gradients.
Significant erosion in the upper reaches of Himalayan rivers is a result of their high-altitude origins. Emerging from lofty mountain ranges, these rivers possess extremely steep gradients,

which impart high velocity and kinetic energy to the water. This allows them to effectively carve deep V-shaped valleys and spectacular gorges through the mountain strata before reaching the flatter plains further downstream.

261. (D) The differential heating of the Indian landmass and the surrounding ocean.
The Indian Monsoon operates primarily due to the unequal heating rates of land and water. During summer, the vast landmass heats up rapidly, creating a low-pressure zone. Simultaneously, the cooler surrounding oceans maintain higher pressure. This pressure gradient forces moisture-rich air to move from the sea toward the land, initiating the seasonal reversal of winds and onset of rainfall.

262. (B) The Sub-Tropical Westerly Jet Stream's northward shift in summer facilitates the monsoon's establishment.
High-altitude atmospheric currents play a vital role in the monsoon's arrival. The Sub-Tropical Westerly Jet Stream, which remains over northern India in winter, must shift northward beyond the Himalayas during summer. This movement creates a space that allows the Tropical Easterly Jet Stream to establish itself over the peninsula, providing the necessary atmospheric conditions for the seasonal monsoon's formal onset.

263. (C) the extent of snow cover can modulate the thermal low over the subcontinent.
The state of snow and ice in high-altitude regions significantly impacts the monsoon's strength. Extensive snow cover over the Himalayas and the Tibetan Plateau reflects more sunlight, keeping the land cooler. This delays or weakens the development of the summer thermal low-pressure system. Consequently, the intensity of the incoming monsoon winds is modulated by these cryospheric conditions during the year.

264. (D) Its pulsatory nature, featuring alternating periods of active rain and dry breaks.
The behavior of the Indian Monsoon is marked by its inconsistency and non-continuous nature. Rather than a steady downpour, it occurs in pulses, with periods of heavy rain followed by dry intervals known as breaks. Additionally, the amount of precipitation varies greatly across different regions and timeframes, making the system highly unpredictable in its spatial and temporal distribution of rainfall.

265. (A) a weaker monsoon circulation and potentially less rainfall.
A reduction in the intensity of the thermal low over the subcontinent directly impacts the monsoon's vigor. If the pressure difference between the land and the ocean is narrow, the suction effect that pulls in moisture-laden winds is diminished. This typically results in a weaker overall circulation, potentially leading to a delayed onset and below-average rainfall across the Indian subcontinent.

266. (B) Black soils (Regur)
Black soils, also known as Regur, are unique to the volcanic landscape of the Deccan Plateau. Formed from the weathering of basaltic rocks, these soils are highly clayey and deep. Their primary characteristic is their exceptional ability to retain moisture for long periods, which makes them particularly suitable for growing crops like cotton even in regions with seasonal rainfall patterns.

267. (B) Tropical deciduous forests.
Tropical deciduous forests are the most common and widely distributed vegetation type across the Indian subcontinent. These forests thrive in regions that experience moderate annual rainfall. Often called monsoon forests, they are characterized by trees that shed their leaves during the dry season to conserve water. Their widespread presence reflects the dominant climatic regime found across most of the Indian regions.

268. (A) Heavy rainfall and high temperatures leading to leaching.
The formation of laterite soil is a result of specific tropical environmental processes. It occurs in regions where high temperatures and heavy seasonal rainfall are prevalent. These conditions promote intense leaching, where essential nutrients are washed away from the topsoil, leaving behind a soil rich in iron and aluminum oxides. This process is commonly observed in the Western Ghats and northeast.

269. (C) The high-altitude areas of the Himalayas.

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Vertical zonation of vegetation occurs where altitude increases significantly, causing gradual changes in climate and plant types. As elevation rises, temperature drops and environmental conditions shift, leading to different vegetation belts. This process ultimately results in alpine vegetation at the highest levels. Such patterns are characteristic of mountainous regions with great height variation, where ecological conditions change noticeably with elevation.

270. (D) The deposition of sediments by river systems.
The exceptional fertility of the northern plains is attributed to the geological process of aggradation. Major river systems, including the Ganga and Brahmaputra, transport enormous volumes of sediment and silt eroded from the Himalayas. As these rivers reach the flatter plains, they deposit these materials, creating deep layers of alluvial soil that are continuously replenished by annual river floods.

271. (C) The fertile alluvial plains of the Ganga river.
Human settlement patterns in India are heavily influenced by the availability of resources and favorable terrain. The fertile alluvial plains of the Ganga River offer flat land, rich soil, and abundant water, making them ideal for intensive agriculture. Consequently, these regions support extremely high population densities, contrasting sharply with the difficult living conditions found in deserts or high mountains.

272. (B) a large proportion of people in the younger age brackets.
A demographic dividend occurs when a nation's population structure features a large proportion of individuals in the working-age group. In India, this is reflected in the youthful age composition, where a significant percentage of the populace falls into the younger brackets. This demographic profile provides a potential economic advantage by offering a large, productive workforce to drive national growth.

273. (D) There is a gradual shift away from agriculture, but it remains a major employer.
India's workforce is currently experiencing a structural transition. While there is a steady shift of laborers from traditional primary activities to the industrial and service sectors, the change is gradual. Despite the growth of urban-based industries, agriculture continues to employ the largest share of the population, highlighting its enduring importance in the nation's overall occupational and economic framework.

274. (A) Physical geography, such as fertile land, plays a significant role in population concentration.
The uneven distribution of people across India highlights the dominance of physical determinants in settlement. Areas with high agricultural potential, such as those with fertile soil and reliable water supplies, naturally attract denser populations. This confirms that the country's diverse physiography, ranging from fertile plains to barren mountains, is a primary factor in where people choose to settle.

275. (C) Genetic and biological composition
Analysis of India's population involves looking at demographic, social, and economic variables. The components usually studied include age and sex ratios, the balance between rural and urban residents, and the levels of education and types of jobs held. Genetic or biological traits are not typically used as categories when describing the general multifaceted composition of a nation's population characteristics.

276. (A) Production is the total output, while yield is the output per unit of area.
In agricultural terminology, production represents the absolute total amount of a crop harvested across a given area or country. Yield, however, is a measure of efficiency that calculates the quantity of output produced per specific unit of land area, such as tons per hectare. While production focuses on total volume, yield focuses on the productivity of land.

277. (D) Wheat and rice
Specific geographical regions in India favor the cultivation of certain crops due to their climate and soil. The Indo-Gangetic plain, with its deep alluvial soil and extensive irrigation facilities, provides the ideal environment for high-intensity farming. This region has consequently emerged as the primary hub for producing wheat and rice, which are essential crops for the country's food security.

278. (B) the spatial differences in environmental, technological, and institutional factors.

The lack of uniformity in agricultural progress across different regions is caused by a variety of overlapping factors. Environmental conditions like rainfall and soil quality set the baseline, while access to modern technology and institutional support, such as credit and irrigation, determine development levels. Variations in these factors create the disparity between highly productive and subsistence farming regions in India.

279. (C) a large total production figure for the country may mask significant regional disparities in agricultural efficiency.
National agricultural data can often hide the significant differences that exist between various states or districts. A country may report a very high total production for a specific crop, but this figure might be driven by only a few highly efficient regions. Other areas may still suffer from low yields and poor productivity, illustrating deep-seated regional agricultural inequalities.

280. (D) improve yield and productivity across diverse regions, not just total output.
Beyond simply increasing the total volume of food produced, the focus must shift toward improving agricultural efficiency. Enhancing yield and productivity across all regions ensures that farming becomes viable and profitable for a larger number of farmers. Addressing these disparities is vital for achieving equitable growth and long-term sustainability within the diverse ecological and economic landscape of Indian agriculture.

281. (A) HYV seeds, chemical fertilizers, and expanded irrigation.
The Green Revolution introduced a package of modern agricultural practices to boost food production. Its core components included the use of high-yielding variety seeds designed to produce more grain, the application of chemical fertilizers and pesticides to nourish and protect crops, and the expansion of controlled irrigation systems to provide a reliable water supply regardless of monsoon fluctuations.

282. (B) facilitate location-specific agricultural planning based on regional characteristics.
Dividing the country into specific zones based on agro-climatic factors allows for more effective agricultural management. Each zone has a unique combination of climate, soil, and existing cropping patterns. By recognizing these differences, planners can develop strategies and recommend crops that are best suited to the local environment, rather than applying a one-size-fits-all approach to the entire nation.

283. (B) the exacerbation of regional disparities in agricultural development.
While the Green Revolution successfully increased India's food supply, its benefits were not distributed equally across the country. The new technologies were primarily adopted in regions with pre-existing irrigation, such as Punjab and Haryana. This led to rapid development in those areas while other regions lagged behind, significantly increasing the economic and developmental gap between different parts of the country.

284. (A) aspects like land tenure, credit facilities, and government policies.
Institutional factors encompass the organizational and policy frameworks that influence farming. These include the systems of land ownership and tenure, the availability of agricultural loans or credit, and the infrastructure for marketing and selling produce. Government policies regarding subsidies and support prices also play a major role in determining how successfully agriculture operates beyond just the physical and environmental inputs.

285. (C) By shifting focus from production to ensuring universal access to food.
Agricultural policy has transitioned from a narrow focus on increasing total grain output to a broader social objective. Modern strategies emphasize food security, ensuring that every citizen has the legal right and physical access to adequate nutrition. This shift acknowledges that high production levels are only meaningful if the distribution systems and economic policies guarantee that food reaches everyone.

286. (D) A strategy centered on public sector-led heavy industrialization.
Immediately following independence, India's economic strategy prioritized the creation of a robust industrial foundation. The government focused on developing heavy industries, such as steel and machine tools, primarily through

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241. (A) Both statements are true, and Statement II explains Statement I.
The rivers of Peninsular India exhibit a distinct behavior compared to those of the north. Most of these rivers are non-perennial, meaning they do not have a constant flow of water throughout the year. The primary reason for this is their heavy dependency on monsoon rainfall for their water supply. Unlike Himalayan rivers, they are not fed by permanent glaciers. Consequently, during the dry summer months, the volume of water in these rivers decreases significantly, and some smaller streams may even dry up completely. Their flow is highly seasonal, reflecting the rhythmic arrival and departure of the monsoon, which is the main source of moisture for the entire peninsular region.

242. (A) Low pressure over the landmass and hot, dry winds called 'Loo'.
The summer season in North India is characterized by specific atmospheric conditions caused by the intense heating of the landmass. As the sun moves northward, temperatures rise rapidly, leading to the development of a low-pressure area over the region. This period is marked by hot, dry, and strong winds known as 'Loo', which blow during the daytime and can be very dangerous. Dust storms are also common as the dry surface is heated. These conditions prevail until the arrival of the monsoon. The intense heat and low pressure are fundamental features of the continental climate in the northern parts of the country during the summer months from March to June.

243. (C) The variation in geological structure and processes across regions.
The distribution of mineral resources in India is not uniform but shows a high degree of regional concentration. This uneven pattern is primarily a result of the significant variation in the geological structure and the geological processes that have shaped the different parts of the subcontinent over millions of years. For example, the ancient crystalline rocks of the Peninsular Plateau are rich in metallic and non-metallic minerals like iron ore and coal. In contrast, the younger sedimentary rocks of the Northern Plains are largely devoid of such minerals. Therefore, the geological history and the nature of the rock formations in each region are the most fundamental determinants of the availability and types of mineral wealth found there.

244. (D) Achieving self-sufficiency in food grain production.
One of the most significant and transformative achievements of the Green Revolution was making India self-sufficient in food grain production. Prior to this movement in the mid-sixties, the country relied heavily on imports to feed its growing population. The introduction of high-yielding variety seeds and modern farming techniques led to a dramatic increase in the production of staples like wheat and rice. This success ensured national food security and provided a stable foundation for further economic development. While it did not solve all rural problems and created some new challenges, the shift from a food-deficient nation to one with a surplus of basic grains was a major milestone in India's post-independence history.

245. (C) Many workers have small, unregulated, low-pay jobs.
The occupational structure in urban India is characterized by the dominance of the informal sector. This implies that a very large proportion of the urban workforce is employed in small, unregulated, and often unorganized activities. Workers in this sector typically lack formal employment contracts, job security, and social benefits like health insurance or pensions. These jobs often involve low pay and varied work conditions, ranging from street vending and small-scale manufacturing to various services. The growth of the informal sector reflects the inability of the formal economy to absorb the massive influx of people into urban areas. Understanding this sector is crucial for addressing issues of urban poverty, labor rights, and overall economic planning.

246. (B) Complete insulation from global economic shocks.
Globalisation has significantly integrated the Indian economy with the rest of the world, bringing several benefits like increased foreign investment and greater access to global markets for domestic producers. However, this integration also means that the country is more exposed to global economic trends. Consequently, a major

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northeast, the steep gradients and difficult environment make construction difficult. Consequently, the railway network in these areas remains sparse compared to the dense systems found in the northern plains and peninsular plateau.

296. (D) Earthquakes and Highland Hazards like landslides
The Himalayan region faces high risks from specific natural events due to its unique geology and topography. Being a tectonically active zone, it is highly prone to frequent and intense earthquakes. Additionally, the steep slopes and fragile rocks contribute to highland hazards such as landslides and avalanches, which are often triggered by heavy rains or the region's inherent seismic instability.

297. (A) heavy monsoon rainfall and river siltation.
Recurrent flooding in the vast northern plains is primarily a seasonal phenomenon linked to the monsoon. During this period, the Ganga and Brahmaputra rivers receive enormous volumes of water from heavy rainfall. Additionally, the accumulation of silt on the riverbeds reduces their carrying capacity, causing the water to overflow into the surrounding low-lying areas and plains every year.

298. (B) The eastern coastal states.
Geographic location makes the eastern coast of India particularly susceptible to the impact of powerful tropical storms. These cyclones, which typically originate over the warm waters of the Bay of Bengal, move toward the land, bringing destructive winds and massive storm surges. Consequently, states along this coastline face a regular and significant threat from these intense meteorological events.

299. (B) Himalayan highland hazards
Glacial lake outburst floods are a specific type of disaster occurring in high-mountain environments. They happen when the natural dams holding back water in glacial lakes fail, releasing massive volumes of water downstream. Because these events are intrinsically linked to the topography and glacial processes of the mountains, they are categorized alongside landslides and avalanches as Himalayan highland hazards.

300. (A) Drought
The availability of water in the semi-arid and arid parts of western India is almost entirely dependent on the seasonal monsoon. If the expected rainfall fails to arrive or is significantly below normal, it leads to a severe shortage of water for agriculture and domestic use. This lack of precipitation is the direct and primary cause of droughts in these regions.

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